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TRANSACTIONS

OF THE

Twenty-sixth Annual Session

OF THE

PENINSULA HORTICULTURAL SOCIETY

HELD IN

WILMINGTON, DELAWARE

January 14th, 15th and 16th, 1913

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PRINTED AT THE NEWARK POST
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OFFICERS FOR 1913

President,
WILLIAM E. SANGER, Cordova, Maryland.

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Vice-President,
EUGENE H. SHALLCROSS, McDonough, Delaware.

Secretary-Treasurer,
WESLEY WEBB, Dover, Delaware.

VICE-PRESIDENTS FOR THE SEVERAL COUNTIES

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New Castle—J. T. Shallcross, Jr., Middletown.
Kent—S. H. Derby, Woodside.
Sussex—John G. Townsend, Jr., Selbyville.

MARYLAND:

Cecil—Charles E. Warburton, Elkton.
Kent—W. H. Harris, Worton.
Queen Anne—W. Irving Walker, Chestertown.
Caroline—Col. A. W. Sisk, Preston.
Talbot—Edwin G. Cover, Easton.
Dorchester—O. H. Hubbard, East New Market.
Wicomico—Fulton W. Allen, Salisbury.
Worcester—Orlando Harrison, Berlin.
Somerset—Frank E. Matthews, Pocomoke.

VIRGINIA:

Accomac—A. J. McMath, Onley.
Northampton—W. L. Elzey, Exmore.

EXECUTIVE COMMITTEE

William E. Sanger, Cordova, Maryland.
E. H. Shallcross, McDonough, Delaware.
F. M. Soper, Magnolia, Delaware.
F. C. Bancroft, Wyoming, Delaware.
Gen. Joseph B. Seth, Easton, Maryland.

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Peninsula Horticultural Society

TWENTY-SIXTH ANNUAL MEETING

The Twenty-sixth annual session of the Peninsula Horticultural Society was held in the duPont building, Wilmington, Delaware, January 14, 15, 16, 1913, President F. M. Soper presiding.

The meeting was called to order at ten-thirty o'clock and the Rev. Josiah H. Crawford, of Central Presbyterian Church, of Wilmington, offered prayer.

The address of welcome was delivered by Hon. Harrison W. Howell, Mayor of Wilmington, and the response was made by Hon. Orlando Harrison, Berlin, Maryland.

The President appointed the following committees: Auditing, Frank E. Matthews, C. M. Peters, A. W. Slaymaker; Resolutions, W. Irving Walker, Charles Barker, W. G. Dawson; Nominations, F. C. Bancroft, Orlando Harrison, Benjamin F. Rash.

The following officers were elected: President, William E. Sanger; Vice-President, Eugene H. Shallcross; Secretary-Treasurer, Wesley Webb; Vice-Presidents for the counties: New Castle, J. T. Shallcross, Jr.; Kent, S. H. Derby; Sussex, John G. Townsend, Jr.; Cecil, Charles E. Warburton; Kent, (Md.) W. B. Harris; Queen Anne, W. Irving Walker; Caroline, Col. A. W. Sisk; Talbot, Edwin G. Cover; Dorchester, O. H. Hubbard; Wicomico, Fulton W. Allen; Worcester, Orlando Harrison; Somerset, Frank E. Matthews; Accomac, A. J. McMath; Northampton, W. L. Elzey. Executive Committee, William E. Sanger, Eugene H. Shallcross, F. M. Soper, F. C. Bancroft, Gen. Joseph B. Seth.

Hon. Orlando Harrison invited the Society to hold its summer meeting in Berlin, Maryland, sometime in August, about the time the best peaches are ripe, and upon motion the invitation was accepted. Mr. Maclean, Manager of the Chamber of Commerce of Wilmington, stated that a large number of business men of Wilmington would attend such a meeting.

Mr. James H. Hendrickson, Vice-President of the New Jersey Horticultural Society, was present as a fraternal delegate from that Society and extended warm greetings, concluding by inviting the Society to attend the summer meeting of the New Jersey Society at Rancocas.

The following letter was received from Hon. Philip L. Goldsborough, Governor of Maryland:

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Executive Department.

Annapolis, Md.
Jan. 15, 1913.

Mr. F. M. Soper,
President of the Peninsula Horticultural Society,
Wilmington, Delaware.

My dear Mr. Soper:

I cannot express to you how greatly I appreciate the invitation of your Society to attend one of its sessions on either yesterday or today. I delayed a little answering your wire hoping that I could be present, but finding it impossible, yesterday afternoon I wired you to that effect. I am deeply interested in all matters pertaining to agriculture, and especially so since my induction into the office I now hold. The problem is a large one, has been greatly neglected, whilst efficiency methods in matters of commercial and industrial activities have had the greatest of attention, but it does appear that the development of the agricultural question, broad and important as it is, has been left to the individual to work out.

Fire recently destroyed some of the buildings of the Agricultural College in this State, and in addition to this, the President of the institution resigned. The Board of Trustees and myself are looking over the country for the presidency of that institution for one of the ablest men that may be found in America. We want to take up the march of progress, and I feel that the establishment of an Agricultural College along broad and unlimited lines purely devoted to agriculture will be taking a step in the direction finally to bring about most admirable results.

With assurances of kind regards, I am,

Very truly yours,
(Signed) P. L. GOLDSBOROUGH.

On Tuesday evening, Mr. Richard Vincent, Jr., of White Marsh, Maryland, gave a fine lecture illustrated by colored lantern slides, of the recent National Flower Exhibition in London, England, with views of the beautiful bulb fields of Holland. Dr. Squires gave a lecture with lantern slide views and moving pictures of "Dynamite in Agriculture"; and on Wednesday night, Mr. O. H. Benson of the U. S. Dept. of Agriculture, gave a fine lantern slide lecture on the boys' and girls' club work.

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REPORT OF THE TREASURER.

Wesley Webb.

Receipts.

By balance	$1,158.72	
Delaware appropriation	500.00	
Maryland appropriation	500.00	
State Board of Agriculture, ofDelaware for prizes	500.00	
		$2,658.72

Expenditures.

Peninsula Produce Exchange of Maryland	$79.76	
S. J. Twilley	25.50	
F. M. Soper & Son, prizes	51.00	
E. H. Bancroft & Son, prizes	23.50	
E. H. Shallcross, prizes	11.00	
Sanger Brothers, prizes	19.00	
J. S. Lapham, prizes	5.00	
W. B. Harris, prizes	2.50	
Mrs. J. W. Killen, prizes	19.50	
Mrs. J. W. Notts, prizes	19.00	
J. W. Killen, prizes	17.00	
Ambrose Killen, prizes	2.00	
F. E. Matthews, prizes	9.50	
J. G. Harrison & Son, prizes	2.00	
F. J. Dukes & Bro., prizes	5.00	
C. S. Powell, prizes	5.00	
C. A. Melvin, prizes	3.00	
W. R. Covington, prizes	.50	
Peninsula Produce Exchange of Maryland	37.52	
Carrie G. Ritter, stenographer, services and expenses	25.00	
R. L. Watts	25.38	
J. H. Carels	5.15	
F. C. Bancroft, expense attending meetings of Executive Committee	5.16	
J. A. Hirons, postage stamps	70.82	
J. S. Godwin, hauling and freight	4.96	
Newark Post, printing proceedings	298.55	
Torsch & Frantz Badge Co. ribbons	21.00	
Bastian Bros. Co. buttons	14.70	
Pennsylvania Cold Storage Co.	1.20	
Wesley Webb, salary and expenses	104.16	
Balance, January 14, 1913	1,744.86	
		$2,658.72

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REPORT OF THE AUDITING COMMITTEE.

The Auditing Committee reported that the report of the Treasurer had been examined and found correct.

Signed:

CHARLES M. PETERS,
F. E. MATTHEWS,
A. W. SLAYMAKER,
Committee.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Whereas, The Twenty-sixth annual meeting of the Society has proven to be the most successful and instructive in the history of the Society, in program, exhibit and attendance, and

Whereas, The members believe an awakening interest on the part of the citizens of the Peninsula and Wilmington, has developed largely as to the possibility and appreciation of our products on the Peninsula, therefore be it

Resolved, That the thanks of this Society are hereby extended to the exhibitors and visiting lecturers who have so liberally contributed; to the press of Wilmington for the wide publicity given the proceedings; to the Wilmington Chamber of Commerce for liberal contributions in money and the time of its officers; to the Delaware State Board of Agriculture for its liberal gift for prizes; to the owners of the Hotel DuPont for the splendid accommodations for our meetings; to the officers and assistants, for the valuable aid in advancing the interest of our Society.

Whereas, Horticulture is one of the most important industries in the State of Delaware, we deem it to be of the utmost importance that Delaware College should have adequate facilities for teaching horticulture; and

Whereas, Instruction in plant propagation, vegetable gardening and other horticultural subjects is seriously hampered by lack of greenhouse facilities, be it

Resolved, That this Society urge that the Legislature look favorably upon any bill appropriating moneys for building greenhouses at Delaware College.

REPORT OF THE JUDGE ON FRUITS.

PROF. C. P. CLOSE.

For best general display of apples: *first prize,* $300 to F. M. Soper & Son, Magnolia, Delaware; *second prize,* $200, Sanger Brothers, Cordova, Maryland; *third prize,* $100, E. H. Bancroft & Son, Wyoming, Delaware.

Special prize, Silver cup, offered by Millard F. Davis, Wilming-

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ton, Delaware, for best plate display of apples, to F. M. Soper & Son, Magnolia, Delaware.

Apples, barrels—*First,* $25, F. M. Soper & Son, Magnolia, Delaware; *second,* $10, Walter B. Harris, Worton, Md.; *third,* $5, Naudain & Son, Marshallton, Del.

Best single box—$50, F. M. Soper & Son, Magnolia, Del.

Best single box open to the world—$50, F. M. Soper & Son, Magnolia, Del.

Boxes—*First,* $10; *second,* $5; *third,* $2.

Arkansas—*First,* E. H. Bancroft & Son, Wyoming, Del.

Ben Davis—*First,* F. M. Soper & Son, Magnolia, Del

English Red Streak—*First,* F. M. Soper & Son, Magnolia, Del.

Gano—*First,* E. H. Bancroft & Son, Wyoming, Del.

Gravenstein—*First,* F. M. Soper & Son, Magnolia, Del.

Givens—*First,* E. H. Bancroft & Son, Wyoming, Del.

Grimes—*First,* Sanger Bros., Cordova, Maryland; *second,* F. M. Soper & Son, Magnolia, Del.; *third,* Naudain & Son, Marshallton, Del.

Jonathan—*First,* E. H. Bancroft & Son, Wyoming, Del.

King David—*First,* E. H. Bancroft & Son, Wyoming, Del.

Limbertwig—*First,* F. M. Soper & Son, Magnolia, Del.

Lankford—*First,* F. M. Soper & Son, Magnolia, Del.

Missouri—*First,* F. M. Soper & Son, Magnolia, Del.

Nero—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* E. H. Bancroft & Son, Wyoming, Del.

Nickajack—*First,* F. M. Soper & Son, Magnolia, Del.

Paragon—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Walter B. Harris, Worton, Md.; *third,* E. H. Bancroft & Son, Wyoming, Del.

Rome—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Sanger Bros., Cordova, Md.; *third,* E. H. Bancroft & Son, Wyoming, Del.

Smith Cider—*First,* Sanger Bros., Cordova, Md.; *second,* E. H. Bancroft and Son, Wyoming, Del.

Stark—*First,* Walter B. Harris, Worton, Md.; *second,* F. M. Soper & Son, Magnolia, Del.

Stayman—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Walter B. Harris, Worton, Md.; *third,* Sanger Bros., Cordova, Md.

Winesap—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Sanger Bros., Cordova, Md.

York Imperial—*First,* Sanger Bros., Cordova, Md.; *second,* F. M. Soper, Magnolia, Del.; *third,* Walter B. Harris, Worton, Md.

Apples, plates—*First prize,* $2; *second,* $1; *third* 50 cents.

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Arkansas Black—*First,* E. H. Bancroft & Son, Wyoming, Del.

Ben Davis—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Sanger Bros., Cordova, Md.; *third,* W. P. Peach, Newark, Del.

Early Ripe—*First,* F. M. Soper & Son, Magnolia, Del.

English Red Streak—*First,* F. M. Soper & Son, Magnolia, Del.

Fallowater—*First,* Walter B. Harris, Worton, Md.; *second,* F. M. Soper & Son, Magnolia, Del.

Gano—*First,* E. H. Bancroft & Son, Wyoming, Del.

Gravenstein—*First,* F. M. Soper & Son, Magnolia, Del., *second,* W. B. Foote, Bear, Del.

Givens—*First,* E. H. Bancroft & Son, Wyoming, Del.

Grimes—*First,* W. H. Conard, Dover, Del.; *second,* Sanger Bros., Cordova, Md.; *third,* Naudain & Son, Marshallton, Del.

Jonathan—*First,* E. H. Bancroft & Son, Wyoming, Del.

King David—*First,* E. H. Bancroft & Son, Wyoming, Del.

Lawver—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* R. P. Taylor, Preston, Md.

Limbertwig—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* J. W. Killen, Felton, Del.

Lankford—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* A. W. Armstrong, Hockessin, Del.; *Third,* Philip T. Pierson, Hockessin, Del.

Missouri—*First,* A. W. Armstrong, Hockessin, Del.; *second,* F. M. Soper, Magnolia, Del.; *Third,* Philip T. Pierson, Hockessin, Del.

Mock—*First,* E. H. Bancroft & Son, Wyoming, Del.

Nero—*First,* F. M. Soper & Son, Wyoming, Del.; *second,* E. H. Bancroft & Son, Wyoming, Del.;*third,* Philip T. Pierson, Hockessin, Del.

Nickajack—*First,* F. M. Soper & Son, Magnolia, Del.

Paragon—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Walter B. Harris, Worton, Md.; *third,* J. W. Killen, Felton, Del.

Rome—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* E. H. Bancroft & Son, Wyoming, Del.; *third,* Sanger Bros, Cordova, Md.

Smith Cider—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Sanger Bros., Cordova, Md.; *third,* E. H. Bancroft & Son, Wyoming, Del.

Stark—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* J. F. Brackin, Marshallton, Del.; *third,* A. W. Armstrong, Hockessin, Del.

Stayman—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Walter B. Harris, Worton, Md.; *third,* Naudain & Son, Marshallton, Del.

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Winesap—*First,* Sanger Bros., Cordova, Md., *second,* F. M. Soper & Son, Magnolia, Del.; *third,* Walter B. Harris, Worton, Md.

Yellow Transparent—*First,* F. M. Soper & Son, Magnolia, Del.

York Imperial—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* Sanger Bros., Cordova, Md.; *third,* A. W. Armstrong, Hockessin, Del.

White Pippin—*First,* Sanger Bros., Cordova, Md.

Arkansas—*First,* E. H. Bancroft & Son, Wyoming, Del.

Champion—*First,* E. H. Bancroft & Son, Wyoming, Del.

Lily of Kent—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* J. W. Killen, Felton, Del.

Smokehouse—*First,* W. H. Conard, Dover, Del.; *second,* W. P. Peach, Newark, Del.

Carlough—*First,* Sanger Bros., Cordova, Md.

Shockley—*First,* Sanger Bros., Cordova, Md.

Pyles Red Winter—*First,* W. H. Conard, Dover, Del.

Carthouse—*First,* F. M. Soper & Son, Magnolia, Del.; *second,* C. H. Fisher, Hockessin, Del.; *Third,* J. W. Killen, Felton, Del.

Sutton—*First,* E. H. Bancroft & Son, Wyoming, Del.

Tompkins King—*First,* E. H. Bancroft & Son, Wyoming, Del.

Beach—*First,* E. H. Bancroft & Son, Wyoming, Del.

Royal Limbertwig—*First,* Sanger Bros., Cordova, Md.

Maiden Blush—*First,* Sanger Bros., Cordova, Md.

Pears, plates—Kieffer—*First,* $2, C. H. Fisher, Hockessin, Del.

Nuts.

J. W. Killen, Felton, Delaware, was the only exhibitor and won the following: *First prize,* $2 each on chestnuts, Japan walnuts, Persian walnuts, black walnuts, shellbarks, and peanuts; and *second prize,* $1, on pecans.

Special Mention.

Canned goods exhibited by Mrs. Frederick C. Snyder, Newport, Delaware.

REPORT OF THE JUDGE ON VEGETABLES.

George Morrison.

White Potatoes. Gold Coin—First, J. F. Brackin, Marshallton, Del.

Irish Cobbler—*First,* J. F. Brackin, Marshallton, Del.; *second,* J. F. Dukes & Bro., Girdletree, Md.

State of Maine—*First,* J. F. Brackin, Marshallton, Del.; *second,* Naudain & Son, Marshallton, Del.; *third,* Frederick C. Snyder, Newport, Del.

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American Giant—*First,* Naudain & Son, Marshallton, Del.

Green Mountain—*First,* J. F. Brackin, Marshallton, Del.; *second,* Naudain & Son, Marshallton, Del.; *third,* J. F. Dukes & Bro., Girdletree, Md.

Rehoboth—*First,* Frank E. Matthews, Pocomoke, Md.

Sweet Potatoes. Big Stem Jersey—*First,* J. F. Dukes & Bro., Girdletree, Md.; *second,* J. W. Killen, Felton, Md.

Early Carolina—*Third,* J. W. Killen, Felton, Del.

Gold Skin—*Third,* J. W. Killen, Felton, Del.

Southern Queen—*Second,* J. W. Killen, Felton, Del.

Parsnips—*Third,* J. W. Killen, Felton, Del.

Turnips—*First,* J. W. Killen, Felton, Del.

Radish—*second,* J. W. Killen, Felton, Del.; *third,* G. W. Burris & Son, Rose Hill, Del.

Celery—*First,* G. W. Burris & Son, Rose Hill, Del; *third,* J. F. Dukes & Bro., Girdletree, Md.

Cabbage—*Second,* G. W. Burris & Son, Rose Hill, Del.

Spinach—*First,* G. W. Burris & Son, Rose Hill, Del.
Parsley—*Second,* G. W. Burris & Son, Rose Hill, Del.

Pumpkin—*First,* J. F. Brackin, Marshallton, Del.

Upon motion of Professor Thomas B. Symons, the Society endorsed the proposition being urged by Hon. Hoke Smith for the establishment in the U. S. Department of Agriculture a Bureau of Marketing.

Upon motion of F. C. Bancroft, a rising vote of thanks was extended to the Chamber of Commerce and the people of Wilmington for the part they have had in making this meeting one of the best we have ever had.

Easton, Maryland, was selected as the place of holding the next annual session.

Mr. Soper made the following closing remarks:

I desire to express the appreciation of the Peninsula Horticultural Society for the generous publicity given our convention by the Morning News, the Every Evening, the Evening Journal and the Sunday Star. Each of the daily newspapers has been running from three to five columns a day regarding the proceedings of this convention. They have shown unusual interest in the horticultural and agricultural activities of the Peninsula, and it is a very great pleasure to me on behalf of this society and on behalf of the fruit growers and farmers of the entire Peninsula to express to them our appreciation.

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WELCOME

HON. HARRISON W. HOWELL, Mayor of Wilmington.

Mr. Chairman, Ladies and Gentlemen:

You probably know by this time, for I think I have repeatedly made the statement, that I am proud of the city of Wilmington and of my connection with it, and equally so of the State of Delaware. I feel this morning that I can say, and honestly say, that never before in my career as a private citizen, or an official of the city, have I been so proud as I am at this moment of the city and the State. It is more than a pleasure to me to realize that it has been possible for the city of Wilmington, not only to gather together the good people that reside here, but the good people all over the State and Peninsula, who bring to the city the best that the Peninsula has produced. In the members of this Society we realize a promise of a greater future for the State of Delaware. Only a few people in this city, in this State even, know of the possibilities of this great little State. The display of fruit that has been made here today is a perfect revelation to me, and I have seen the former exhibits more than once. I have sometimes wondered if you could keep such a display going on and on, year after year, and this one is better than ever. I want to say to the people of Wilmington that they ought to feel proud that they have a State composed of the people it is composed of. The men we are pleased to call farmers I suppose we will have to acknowledge are going to be the biggest in the State. For years and years they have sent to us the rock-bed foundation of the city of Wilmington. Farmers used to depend upon their brawn and strength to succeed in agriculture. I am glad to see that things have changed. It seems to be the ideal of the city man to become a farmer. At the last census, made for the city of Wilmington, we had not increased proportionately to what we should have, but the figures show that the population had wonderfully increased in the rural sections around Wilmington. There was more than an average increase for the city and county. The call of the country has taken the cityman back to the place where the air is better and sweeter, and I want to say to the people in the country that the people of Wilmington are willing to go there in sufficient numbers, but we do not desire to have them all go. The State of Delaware has more acres of good land in proportion to its size than any other state I know of. The day is coming when it will be valued by the inch rather than the acre for the purpose of cultivation.

I do not know who is responsible for bringing you here on this

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occasion, but presume it is the Chamber of Commerce acting with the officers of your society, and I want to say that the Chamber of Commerce has in this one act established a reputation for itself in the State of Delaware. Probably some of the people down the State are no better acquainted with the people of Wilmington than the people of Wilmington are acquainted with the rest of the Peninsula. The city of Wilmington has had an awakening from the sleep that has lasted many years, and never before have the people shown such a disposition to be awake as they have today. The Chamber of Commerce is organized to promote the business interests of the city and of the whole Peninsula, and I know that the Chamber of Commerce in promoting these interests will establish for itself a reputation throughout the country. The gentlemen who are here today, representing the horticulture of this Peninsula, are not simply farmers and business men, but they are professional men, and professional men are appreciated everywhere. Specialists among horticulturists are men of the same caliber as specialists in other professions. These are the men that have produced the results that we see here today in this exhibition of fruits and vegetables, and we should tell the whole world about it. The gentlemen who raise such apples as we see here, and such corn, and who improve the soil, are specialists just the same as there are specialists in other professions, and such specialists will be more and more appreciated by the people of the city of Wilmington, a city that will soon be so large that we shall demand that the fruit growers of the Peninsula give us the first opportunity of buying what they raise. We are willing to pay more for these fruits raised on our own soil than for fruits raised elsewhere.

I would like to take a moment to speak of another thing, and that is to say to you that I have a desire to become a farmer, and I am going to be one if I have to confine my operations to a single acre. I have had a desire to go back to the country, but the desire has never been gratified because when I drive out into the country, I find that the land is so high that it is beyond my reach. Farming land has increased rapidly in price. If it were possible to place an order without the price, I would have two or three farms, but the way things are now, I am afraid that my size of a farm will go down to a quarter of an acre. The lands in the vicinity of Wilmington that are desirable are high in price. I believe that the land all down through the Peninsula is desirable land and I want to become acquainted with it and to own some of it, right next to some farmers who are thrifty and prosperous and who have well tilled, up-to-date profitable and attractive farms.

In order that we may facilitate our meeting together, it is necessary that either the people of Wilmington shall go down into the country, or the representatives of the horticultural interests shall come to Wilmington. I believe that we should all go down into our

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own state and become acquainted with it, and that the farmers should take time to come to Wilmington. In doing these things it is necessary to use the roads, and we should give immediate attention to good roads. We have been making good roads in some parts of the State, and I hope that we are soon to have a road throughout the length of the State that will be the best road in any part of the country. It should go through that district that has suffered most from the lack of good roads. Build such a road in the lower part of the State and Wilmington and New Castle county will be able to meet you. We want the roads improved to such a degree that all the citizens can have the opportunity to meet with all the people daily, so that in time good roads will bring us all together in one large family.

I had the good fortune to be born in New Jersey. I say the good fortune because some people had the wisdom to select the proper State for a permanent residence. When I first came here it was for a short visit, but it did not take me long to remain here, and I hope to end my days as a resident of Delaware. There is nothing anywhere to equal it. When I go away from home, I am always in a hurry to return, else I might extend my travels further. Good fellowship exists here. We have some differences of opinion, but the time is coming in the near future when Delaware will be one big home for us all, and people from everywhere will be glad to come to see this large family in Delaware.

It is my pleasure to offer the freedom of the city to all the guests here today. Whatever we have is cheerfully given. The citizens of Wilmington stand ready to show to you every courtesy. The Chamer of Commerce will do everything in its power, and we invite you all to partake to the fullest extent of all the good things that we possess.

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RESPONSE

HON. ORLANDO HARRISON, Berlin, Maryland.

Mr. Chairman, your Honor the Mayor, Ladies and Gentlemen:

On behalf of the members of the Peninsula Horticultural Society, I desire to express our hearty appreciation of your cordial welcome. Such a wholesoul welcome does not take us by surprise. I was born in Delaware and my wife is from Delaware and I always feel welcome in your city and anywhere in the State, knowing well your hospitality.

The horticulturists have been feeding the people of the cities for years; now let the city co-operate with the tillers of the soil. Give us your boys and girls, at least during the school vacation, and let us show them the great advantages of out-of-door life, where there is plenty of room, sunshine and water. The greatest opportunity that can be offered to these boys and girls is the chance to develop them on the farm. I have four boys and it is my desire to see them well trained in the country life as we have it in Delaware and on the Eastern Shore.

Delaware and the Eastern Shore of Maryland must co-operate if we are to succeed in developing the Peninsula. We have succeeded in a measure and we are proud of our improved soils and our improved railroads that make it possible for us to get our produce to market. The refrigerator cars furnished by the railroad companies, and the ice plants that we have built along these roads, make it possible to deliver our perishable fruits in the city in prime condition, and they have done more than anything else to develop the Peninsula.

The Delaware and Maryland Experiment Stations and the demonstration farm of the Delaware railroad, are growing fruits and vegetables and are offering to show the products of the Peninsula to the public at various expositions without cost to us. At the recent land show in New York City, the Railroad Company's exhibit of our products took the first prize of all.

We, of Maryland, appreciate what you, of Delaware, have done to develop your orchards. It has been my privilege to observe these orchards from my boyhood, and they are valuable and so inspiring that we have interested ourselves in planting in your state, in the last two years, more than fifty thousand peach and apple trees. I take pride in showing your orchards to the visitors who come to see me.

The greatest need of the fruit grower today is good roads. Delaware is the gateway for us to reach Philadelphia and New York. We

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are building roads in Maryland and you are welcome to use them. Will you co-operate with us. Our State has appropriated money for more roads, contingent upon your action. Gentlemen, be honest and not selfish and do not let your Legislature adjourn until you have provided for a concrete road through your State. Now is the time for action. We are suffering by your delay.

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PRESIDENT'S ANNUAL ADDRESS

HON. F. M. SOPER.

Members of the Peninsula Horticultural Society, Ladies and Gentlemen:

We are here assembled for the 26th annual meeting of The Peninsula Horticultural Society, at the invitation of the Chamber of Commerce. It was a question in our minds whether it would be advisable for this meeting to be held in Wilmington. Various questions deserved consideration, probably none more than attendance. It has always been the desire of the members of this association to have as many attend the sessions as possible, believing that each derive some benefit by associating with the other. In accepting the invitation of the Chamber of Commerce, the executive Committee was influenced by the apparent desire that the citizens of Wilmington and others as well, be enlightened as to the possibilities which are within the grasp of those who make the latent forces of our soil active. The conclusion was formed that you have the advancement of the Horticultural interests at heart. We appreciate both your efforts and financial assistance extended us that this might be made a memorable meeting.

The day has come when not only the agriculturist but the city folks as well are interested in the products of the soil. It has not been so many years ago that the drift of the youth of the country was toward the great centers of population, because it was supposed that there as no where else, independence and wealth were to be gained and comforts and pleasures to be enjoyed. Times have changed. Men and women now take a different view of the occupation of farming, and especially that portion which is horticultural, and realize that the close proximity to nature and her laws brings out the best that there is in man. He finds independence in a different sense, that which enables him to know no one as his superior, an influence which makes him feel that on his own efforts largely depends his success.

"Far off fields look green." Man seldom realizes the possibilities that lie within his grasp. I often think that the inhabitants of this Peninsula and especially of Delaware have for years looked to other sections to offer to the trade that which they could furnish, and often times their own would be a better product. You present who are not producers but are consumers of farm products are probably not aware of the fact that in no other section of the country can you obtain fruits of superior quality.

The location of the fruit producing centers, in fact all parts of

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the Peninsula are very near the best consuming centers. Our products have not to be transported long distances, thereby incurring large freight bills for transporting of the same. Because of short hauls our perishable products can reach the consumer in the best possible condition. These and many other conditions should make this Peninsula a land to be sought after by those intending to go into the business of fruit growing. Agricultural education and up-to-date appliances hvae changed the farm life. It used to be that main strenth and awkwardness were the main requisites that a farmer must have in order to secure an existence, but this has changed and instead intelligence, properly used, makes the occupation of farming profitable, changes the work that was considered a drudgery to a pleasure and affords man an independence not to be found in any other occupation.

I feel that every improvement betters every division of farming. Good roads may be considered a hobby of mine but I see in them betterment to mankind and beast. We have been exhorting the Transportation companies to take more care of our products while hauling them to the distributing centers, while at the same time failing in the majority of instances to pay proper attention to the delivery of such goods to the depot. Good roads enable us to place our fruit on board the cars in better condition than if it were hauled over such poor roads as we have in Kent County, Delaware. We as members of this organization are losing money on every load of fruit we deliver. We should be leaders in demanding relief from existing conditions.

At no time in history are so many in different walks interested in the development of the latent wealth of this Peninsula. It may be said that there are those who do not dwell in our midsts who are working that this little Peninsula be made more productive. At this time I take the liberty of saying that the present Board of Agriculture of the State of Delaware has and is doing more for the farmers of the state than any previous board.

In the past the west has been placing on our eastern markets her fruits in a more attractive manner. Such I may say as to compel us when employing old methods to occupy second place, leaving her the fancy trade. This season marks the change in conditions. Even though their fruits are somewhat off size, their attactiveness does not help to hold their prices up to those of Delaware box fruit.

This organization has always striven to have our fruit properly placed in packages that would attract buyers of fancy goods. Efforts in the past have been made to teach Delawareans how to pack apples in boxes. Giving credit to all for the efforts that have been put forth along this line, still I feel that great credit is due the State Board of Agriculture for bringing to us, free of expense on our part, practical Western information and instruction in packing our apples in boxes. The Board employed an expert apple packer, who demonstrated how apples should be packed. His time was spent at the farms of Messrs.

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Derby, Bancroft and Soper. A large number of people took advantage of this opportunity. A limited number have gained information by the efforts put forth. To my knowledge Delawareans have not packed properly. There is much to be learned, yet I hope that the packs of this year will be better than those of last. With experience gained by practice they should. I know not what the plans of the State Board are for another year or even if they are considering any more work along this line. Still I feel that because intelligent labor is scarce an effort should be made to instruct more, so that whosoever desires packers, who have some knowledge of the work to be done, would know where they could be obtained. Therefore a school located at some central point for a week or more should be held, not only for the instruction of labor but for the instruction of the small fruit grower as well. The efforts to help the grower have not been confined along this line only. The State Board has very generously offered $500 for premiums to be awarded at this meeting.

While at home we may feel that our fruits are better than the other fellows. We may think that it is not worth the time and expense to attend the meetings of this organization, but those who have been very much interested along horticultural lines will because they know that benefit is to be derived by so doing. It has been known for years past that only by offering premiums could they be brought out. The premium list this year has been arranged in the hope that the small grower would be induced to bring his products with him to Wilmington, with the knowledge that there is a reward awaiting him, providing his products merited it. In the past the arrangement has been such, and it may be said to be due to the lack of funds, that the small grower could not compete on an equal basis with the larger ones. This year it is different, no one or two men can carry off all the honors. The larger growers have the natural advantage in competing for only two prizes. In competing for every other prize the small grower has an equal chance with the larger growers, and there lies the redeeming feature. We have been able to offer to the grower something in the shape of reward if he would come out. Small growers and those who are just starting are the ones we have tried to induce to compete for the prizes. If success should not crown their efforts, in the future the information that they should gain by comparison of specimens and the discussions during the sessions will enable them to come with something better next year. In this way we will be nearing the great result that we have been striving for, the production of more and better fruit.

The Eastern grower has made practically no attempts at publicity. While we have been sitting idly by, our Western growers have been advertising every product of their soil. Necessity has compelled them to do so. Other markets than their own they had to seek. Their untiring efforts along this line and intelligent manage-

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ment of their orchards enabled them to place upon our markets an apple of inferior quality, though of better appearance. Through the scientific information given us by the Department of Agriculture and Experimental Stations, we have not failed in our efforts to produce that which may be termed "A REAL APPLE." But we have failed to impress on the consumers that the fruit from the Peninsula has the quality. Our method has been let the fruit introduce itself, so to speak. In a way this is very well, but to obtain results in a shorter time there is but one way, that of publicity.

It has been a common practice of certain growers who have only a limited number of early apples to pick their inferior winter apples, as soon as their early crop has been harvested. By those I mean such varieties as have practically no commercial value in their season of ripening. The practices of such men should be halted. It is a cold fact that as soon as such fruit reaches its destination the prices on our good fruit falls. The brokers at the stations seem to take but little interest in preventing this condition of affairs, or either do not care to prevent such goods going on the markets. It is our duty to take the proper course to prevent such fruit being shipped during the season of early apples.

The trend of the growers for several seasons past has been to find something in the form of chemicals that would give the same results, as only our soil and the sunshine of providence can produce. Sunshine can color our fruit better and at less expense to the grower, than any chemical or combination of chemicals on the market. Therefore we should be cautious in accepting spray materials which are to be applied to the fruits, as too much injury has already been done.

I feel very thankful to those who have so generously rendered assistance in working out the plans for this meeting. It is to be hoped that each one present will gain much information that will prove to be profitable to him during the present year.

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REPORT ON APPLES

C. P. Close, *Chairman*,
U. S. Depart. of Agriculture, Washington, D. C.

It is a pleasure to me to bring to you all the greetings from the United States Department of Agriculture. We who are employed by the Department are especially pleased to be brought into touch with the fruit growers and to get back to our old stamping grounds occasionally. I know the Peninsula as well as, or better than, most of the men in the Department do, since it was the scene of my horticultural activities for several years.

Unfortunately for me, I was unable to visit the Peninsula in 1912, so had to get my information on the behavior of apples this year from the other members of the committee and by correspondence with the fruit growers, in answer to questions put to them. There was nothing strikingly new presented in their answers except the old lesson of *thoroughness* which was insisted upon in nearly every reply. That in itself means progress. The growers realize that thoroughness is absolutely necessary and they will do better from year to year, and improved apple culture will continue.

The condition of the trees in the spring was good. No winter injury was reported. The blossoming was in great profusion, nearly every variety blossoming full. The June drop was less than usual, especially where the orchards were well cared for. Neglected orchards did not set fruit so well and had more of the June drop. The color and finish seem to have been better than usual, you can see that by looking at the apples in the exhibition hall. The Winesap seems to have given a fair to good crop; Stayman Winesap and Rome, fair to heavy crop; York from poor to good crop; Ben Davis, Nero, and Stark, a heavy crop. Gano was only mentioned once and that was in connection with injury by bitter rot. Early Ripe and Williams gave good crops. Gravenstein gave from very poor to good results.

Summer apples were especially profitable. Prices ranged from $0.50 to $2.25 per hamper, the hamper being seven-eighths of a bushel, the general average price being from $1.00 to $1.40 per hamper.

Of the winter varieties, more than half of the crop seems to have been sent to cold storage. That which was sold at the station brought from $2.00 to $3.20 per barrel. The highest price so far quoted was $6.00 per barrel for winter fruit. It is interesting to note at this time that Hood River apples are selling at from $1.50 to $2.00 per box, while good Delaware apples are selling in Philadelphia as high as

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$3.50 per box. When you realize that it costs the western fruit grower fifty cents to produce and pack a box of apples, fifty cents freight to get it to the eastern market, ten cents association charges, storage charges, and a profit for the middleman, you will understand that somebody is losing money this year on western fruit, and this somebody is the western fruit grower.

The bushel box seems to be growing in favor on the Peninsula and that is as it should be. I was glad to hear Mr. Soper report that the State Board of Agriculture will establish a packing school. This is a move in the right direction and we need to get an experienced man to teach our apple growers how to grade their fruit according to size and color. This grading is much more difficult than the packing is. The growers here must get into the practice of packing the best grades in boxes. There is no limit to the prices which may be received, nor to the profits which may be realized by growing such fruit as may now be seen in the exhibition hall.

One grower said that one of the things he had learned this year was that after the second year a plow should not go into the orchard, but all cultivation should be done with the cutaway harrow. We cannot adopt this practice absolutely for the plow is a good implement in the orchard if it is properly used.

The most successful growers on the Peninsula are bearing down on that one word—*thoroughness*. I would say to the newer fruit growers present that you cannot cultivate too thoroughly, spray too thoroughly, prune too correctly, nor fertilize too intelligently, and all of these operations must be done thoroughly to obtain the best success.

ORCHARDING IN THE NORTHWEST

PROFESSOR E. R. LAKE, *Secretary,* American Pomological Society.

I was asked to give a lantern slide talk this afternoon, but because of a misunderstanding no arrangement has been made to darken the room. I will, therefore, content myself with making a few general remarks.

I had the pleasure last summer of seeing some of your Delaware apple orchards and I am glad now to see the people of the Peninsula face to face, to see what the fruit growers of the east look like. I am gladdened also to hear about the good prices that you are receiving for the apples grown here. The prices cited by Professor McCue and Professor Close are better than the prices now paid in your local markets for western apples. The fact is, however, that you can accord much of the credit for this to the pace set by the western growers,

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which you are just beginning to follow with no little satisfaction and success. The northwest during the past quarter of a century has taken much of the best horticultural heart and brain of the east and with it built up an almost model fruit industry. Stupendous obstacles have been overcome while a product of very high quality, and finish has been placed upon the world's markets in a style of pack entirely distinct and uniquely attractive. Estimates are assuring that by 1915 the northwest Pacific apple crop will be fifty thousand cars and the railroads cannot by any possibility handle but thirty thousand cars. There is room in China for some of these apples and China is now becoming civilized. They will soon want Pacific Coast apples. The east charges the west with many shortcomings, but it should give credit for what the west has done in pace making at least. You lose sight of a few things.

Orcharding began in the northwest in 1852, and the first apples produced there readily sold at $2 apiece. Later they were shipped to California in shoe boxes and other boxes and thirty to forty dollars a box was not an uncommon price. That was in the days of the gold craze of California. As the gold craze subsided, and California turned her attention to fruitgrowing the fruit market for up-coast fruit declined; the trees were neglected; they became moss-grown and soon had the appearance of decrepit old trees. A Mr. Stewart of Illinois came to the southern valley of Oregon some twenty-eight years ago when he was eighty-five years old. Expecting to live a hundred or more he said he proposed to plant an orchard and renew the pleasures and anticipations of his youth—the blossoming and fruitage of trees. To the people then engaged in general agriculture and mining he pictured the beautiful Rogue River Valley as a garden spot of orchards, a spot that would make a name in all the world. He proceeded to interest the people and individually put out over 200 acres of apples, pears, peaches and plums. In 1899 pears from the trees of some of those earlier plantings sold in New York for $6 per box. Later the valley became one continuous forest of orchards. About the same time another far-seeing man, "Hood River" (E. L.) Smith, scented the same outlook for northern Oregon and through the examples of these two men and their associates, ably abetted by Dr. J. R. Cardwell, a native of Virginia and an enthusiastic fruit grower, the whole northwest became absorbed in orcharding under the slogan, "a high grade product in fancy packages."

The spirit spread until as many as 1,000,000 trees, or 35,000 acres of orchards have been planted in a single county. After these first orchards began to bear well the shipping problem became one of moment. Among the factors that have been influential in helping to solve this many sided question none has been more effective than the Commercial Club, the character of which may be indicated by the fact that of the 150 members of the Hood River Club about 125 are Univer-

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sity men representing Harvard, Yale, Princeton, Michigan, Cornell, and others of like rating.

The tremendous force of an organization of this character must be evident to anyone. When such men take hold of any problem, something happens. What transpired in that region in the fruit industry you well know. It has been the burden of your discussions for several years, and your exhibit here today is evidence indisputable that you are taking advantage of the good features of the western orchard practices. A few of this character of men are now turning their attention to the orchard possibilities of the East. Some of them have settled in Virginia, West Virginia, Western Maryland, Pennsylvania and New York. One inducement that attracts these men to the East is the marketing problem. On the Pacific Coast land is selling for $500 to $600 per acre, or even more. While Eastern land is selling for $25 to $100 per acre. The average man can handle only about 15 to 20 acres of orchard. Occasionally a "wholesaler" engages to manage a quarter section or more but not many are really equal to such a task. In fact there are only a few competent orchardists. All can talk; but few can do.

Mr. Harrison—What varieties of apples succeed in the Northwest?

Professor Lake—Yellow Newtown, Esopus Spitzenberg, Winesap, Jonathan, McIntosh, Ben Davis, Gano, etc.

If you will allow me to make a suggestion in regard to your problem, I should suggest the passage of a law to the effect that no wormy or diseased fruit be allowed to be offered for sale on the markets. I suggested this in Virginia about three years ago and they have slept on it, and I fear are afraid to enact anything so radical for fear that it would be a boomerang. Such a law ought to enthuse you older men and it would give the young man new hope and new energy. It will always be necessary to raise hay and cabbage and grain, and the average farmer can raise these crops successfully. But we must have keener men for the fruit orchard. Make it a penal offense to offer wormy or scabby fruit on the market and you will induce bright young men to enter the occupation of fruit-growing. Such laws are on the statute books of all the Northwest States and they have always been proud of that fact; proud of the fact that fine fruit graces the local market as well as the foreign one. Buyers are always eager for the best apples. We may soon expect good apples to be abundant, even very good apples will be abundant, but of very best apples there will always be less than enough to supply the market demands for such fruit.

In Altoona, Pennsylvania, last December carloads of apples reputed to be from New York were sold at a net of 12½ cents per bushel. At the same time choice well-packed fruit of a local grower was selling for $2.00 per box. Twelve cent apples are a disgrace to

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the business and the sale of this quality of fruit ought to be prohibited. Another service that your society with others could do the business of fruit-growing is to help educate the public to ask for specific kinds of apples, such as Grimes, Stayman and Paragon, if you please. We should make a name for specific varieties of apples and then there will be a demand for them just as there is for shredded wheat biscuit, or other special product of merit. The public must be informed as to the merits of varieties, not just fruit. The people in cities are clamoring for fine fruit but they cannot get it at reasonable prices. Tens of thousands work in offices where oxygen is scarce and they must have apples and other fruit to give tone to the system and maintain health.

It is our duty as fruit growers to acquaint the public with the merits of specific varieties, see that fruit is marketed under proper labels and then instruct as to the season, use and value of the best varieties.

MODERN PEACH CULTURE

PROFESSOR C. A. MCCUE, *Horticulturist,* Delaware Experiment Station.

I scarcely know where to take this subject up as our New Jersey friend is on the program to follow me and I want to keep out of his road.

The reason I selected the subject of peach growing for Delaware is because peach growing has been on the decline for the last ten years. Everyone is going apple crazy and not without justification. I believe that there is still money in growing peaches, and I want to encourage the industry. There can be just as much money made in growing peaches as in growing apples. There are many men who could make a success of peach growing who would never make a success in growing apples. There is plenty of room on the Peninsula for growing all kinds of fruit. The outlook for peach growing is particularly favorable to the Eastern Shore of Maryland and Delaware. We are occupying a position that gives us the control of the market for a short season. Early in the season Georgia and Alabama send peaches to the market; later on the peaches from Western Maryland, Pennsylvania, Connecticut, New York and Michigan are shipped; but in between these two great crops of peaches there is a period of two or three weeks when the market is bare, and that particular period is where the peaches of Delaware come in and is the place we have to fill in the peach market. If we do not take advantage of that situation, we are not doing our whole duty to agriculture. Twenty years

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hence we may be within easy reach of twenty million people and they all have to be fed. The seaside resorts are growing rapidly and demanding more fruit every year. These resorts are crowded at the time our peaches ripen. I think that we will be very foolish if we abandon the peach industry.

Peach yellows is known to most of you for this disease has been in Delaware for many years. In many places at the present time there is scarcely a peach tree to be found where formerly the land was covered with peach orchards and where were produced the peaches that made Delaware famous. Those orchards went out with the yellows. The San Jose scale and the brown rot are more recent troubles, and when these appeared the peach grower thought that his cup of woes was full, but we have learned to control the San Jose scale and the brown rot, and we can control the little peach and the yellows if we go about it in the right way. When trouble appears, we should not throw up our hands and quit. We have a peach orchard on the College Farm and three years ago I found a tree that had yellows. That tree was taken out and one replanted in its place and up to date no trace of yellows has been found on it. I have taken out some suspicious trees and I expect to replant others where they were taken out and hold that orchard intact regardless of yellows. I firmly believe that it can be done. The man who will watch his trees closely and act promptly can control any trouble that may come along. I realize, however, that epidemics of yellows may occasionally come and sweep an orchard away in spite of the owners' vigilance.

The report of the United States census for 1910 was based on the fruit crop of the previous year, and, as we are all aware, that was a year of very poor fruit crops in Delaware. The report is, therefore, very misleading as to the importance of the fruit growing industry in Delaware. The 1910 census gives the value of the peach crop of Delaware for that year as $21,000. If the census had been taken the following year, the value of the fruit crop instead of being $21,000 would have been $800,000.

At the particular time when we may occupy the peach market there are several good varieties that ripen. The first of these is Carman. In times past it rotted badly but the rot can be controlled. We run some risk in raising Carman for we may strike the market before the Georgia Elbertas are over, and prices then would not be good. Following the Carman comes Champion. This variety also was formerly condemned on account of the rot, but it should be profitable now. Champion can be followed by Belle of Georgia which is the queen of peaches, as Elberta is the king. The Belle is a sure cropper and is a delicious peach. Elberta is the last to ripen of any variety that we should plant, for by the time we are through with Elberta, the orchards farther north are pouring their fruit into the markets. Fox Seedling brought good prices in the Wilmington market last year,

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and some of our growers find Frances a good variety to plant. The last two varieties named ripen after Elberta. While we have but few varieties to choose from there is no reason why we cannot make a success of these varieties.

In starting an orchard particular attention should be paid to the borers. When the young trees come from the nursery every tree should be closely examined for borers and if any are found take them out. If left in they will prove a very serious menace to the young trees. I do not believe that I will be very far out of the way if I say that one-third of the trees that are supposed to be killed by the yellows are really by the borers. My experience is that the borer is one of the most serious enemies of the peach. It is the most elusive. We have to get after them with penknife and wire. Last summer I had some trees that began to go into decline and I was at a loss to locate the trouble. The buds were rather large, the internodes shortened, the leaves were crinkled and drooping on the stem. At first I though there might be black peach aphis on the roots but none were found. Finally I found that we had not gotten the borers all out the preceding year and that the trees were slowly being killed by borers. Since that time we have been extremely careful, and we expect to be still more careful in the future. We dig the borers out three times a year if necessary. We go over the trees in June, and again in September or a little latter, and then we go through the orchard early in the spring to get what we missed the fall before.

In the early days, peach growing was too easy in Delaware. All we had to do was to plant a tree and nature did the rest. As a rule the more troubles we have to deal with the more fruit we grow. It is as true of the peach as with the apple. It takes the obstacles we run up against to prove whether we are horticulturists or mere farmers. Some years ago I was employed by the U. S. Forest Service and I remember hearing Gifford Pinchot say that as long as everything was going along all right he could not tell one man from another but when trouble came and things began to go wrong the good men began to come to the front. When difficulties arise, then the good fruit grower shows up and the poor fruit grower goes to the wall.

A peach orchard should be cultivated and should be cultivated thoroughly. Some say that you can over-cultivate and that the peach cannot stand prosperity, but you have to remember first of all that you have to grow a tree before you can grow fruit. It is a poor plan to pick out a poor piece of land to plant a peach orchard. *The peach can stand all the prosperity you can give it if you properly regulate the prosperity.* You can and should hasten the growth of the trees by proper methods of cultivation. The orchard should be cultivated thoroughly until mid-summer, and then you should stop, and when you stop you should put some cover crop in the orchard to grow through the fall and possibly through the winter. This will check the

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growth and put the tree in good shape to go through the winter. If you do that and choose your cover crops judiciously, you will come out all right.

Pruning is another subject upon which there is a great difference of opinion. The question is largely an individual one rather than a general one. What will do for one man will not do for another. A man must adapt his operations according to his own individuality. Personally I want my trees headed low with about three main limbs. Then I would head back vigorously the first and second years and get a big growth of trunk and a good root system. It is important the first two years to make a root system; after that make the top and get the tree into shape so that it will be able to do business when the time comes. Summer pruning is, in a way, a comparatively new art. We should give it a great deal more attention in the future than we have in the past. The peach tree should be gone over in June or July and the suckers and other succulent growth should be taken out at that time. If done at the proper time, no more pruning will be needed and the energy of the tree will go to the manufacture of fruit buds for the next year. If you prune too early in the summer you will stimulate wood growth, and if you do it too late, the fruit will not be properly strengthened.

If you have scale lime-sulfur wash is the thing to use. Of course you have to use it before the peach buds begin to open, and in using it you not only control the scale, but the leaf curl also. The proper method of control of San Jose scale is a dead issue. Three weeks after the petals fall spray with arsenate of lead, and a month later spray with self-boiled lime sulfur and arsenate of lead. One month before the fruit ripens spray again with the self-boiled lime-sulfur. This treatment will prevent the brown rot if you do the work properly. Last year out of 1700 baskets of peaches in our orchards I saw only 3 peaches that were affected with brown rot. If you control the curculio you help to control the brown rot. By controlling the curculio you are going to cut down the June drop. Our June drop last year was only two or three per cent but it probably would have been forty or sixty per cent if the orchard had not been sprayed.

Some lessons are to be drawn from our experiments with cover crops during the last few years. Cowpeas make a good growth where there is a dense shade being much better in this respect than soy beans. They have the disadvantage of being killed by the first frost and are of no further service as a winter protection to the ground. We tried rape with cowpeas and rape will live through the winter. Together they make a very good cover crop, for you get the benefit of a winter cover and also of a nitrogen gathering cover crop. However, rape will not stand much shade and so should not be used except when the orchard is young. The same thing might be said of cowhorn turnips—

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they will not grow in the shade. Rye is not a good cover crop unless it is plowed early in the spring. It takes too much moisture from the land.

The kind of cover crops used and the kind of fertilizer used both have a direct bearing upon the yield of fruit. For illustration this past season we had two small plots of Belle of Georgia peaches side-by-side. The elevation and exposure were the same for both blocks. They had been treated exactly alike in every particular except that the cover crops used were differnt. On one the cover crop for the last three years had been oats, while on the other a mixture of rye and vetch was used. This was the first year that the orchard bore any amount of fruit. The oat cover crop plot yielded 160 pounds of peaches per tree. I believe that these results were due entirely to the effect of the oat crop. The weather was extremely cold during the winter and I think that the oats put the buds into a far better winter condition than did the rye and vetch. The tables might be turned after a mild winter. Another interesting comparison is between the cowpea and the soy bean cover crop plots. The soy bean block was not as well located as the cowpea block as regards elevation, altho they were side by side on a hill side, the soy beans lower down. Yet the soy bean cover crop block yielded at the rate of 82 pounds of peaches per tree as against 74 pounds per tree for the cowpea block. The block next up the hill above the cow peas had no cover crop and yielded only 38 pounds per tree.

The cowhorn turnip block lying next the oat block but lower down the hill gave 73 pounds per tree; the check block just below it, 33 pounds; the crimson clover and rye block just below the last check mentioned and along side the cowpea block gave 97 pounds per tree, while the cowpea and rape block lying along side the soy bean block gave 65 pounds of peaches per tree.

The most striking fact in this set of figures and the most convincing is that *all plots having cover crops, no matter what, without exception outyielded all plots which had no cover crops sown upon them.* The cover crop is of vital importance in the modern peach orchard.

Before closing a word about fertilizers. I have said that a peach tree can stand prosperity; but you must regulate that prosperity. The trouble has been that in the past the prosperity has meant nitrogen prosperity alone. If you furnish the proper amounts of potash and phosphoric acid along with the nitrogen, the amount of nitrogen that you can feed a peach tree and still keep it bearing is astounding. In the college orchard we have a plot of Elbertas that have been fertilized regularly every year for four years with 100 pounds of nitrate of soda, 100 pounds of muriate of potash and about 450 pounds of acid phosphate per acre. Yet that block of trees is not only in perfect health but produced 136 pounds of peaches per tree while the

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nearest check block gave but 88 pounds of fruit per tree. The peaches were not as well colored as those on other blocks and had a tendency to run smaller. Also they were several days later in ripening. It is my belief that nitrogen and potash are the two principal elements concerned in raising peaches. The peach grower of the future has got to pay more attention to fertility in his soil and methods of renewing it than did the old time peach grower. Don't be afraid to feed your peach trees. Force them from the start. Get a big tree as quickly as possible. Get a big bearing area. Keep your nitrogen balanced with potash and phosphoric acid. Prune so as to let the sun shine in. Cultivate, spray, choose your cover crops carefully. Study the effect of methods of culture and fertilizers upon date of ripening and I will predict that the Delaware peach will again come into its own.

PEACHES

JOSEPH BARTON, Marlton, New Jersey.

The first thing to consider in putting out a peach orchard is to decide upon the location. You can grow peaches on almost any ground provided that it is fairly dry or well drained. You should grow the trees where they will not have wet feet, for the peach cannot stand too much wet at its roots, and furthermore, the orchard should not be on land that is closely surrounded by wet ground. The ground the tree stands on may be ideal, but if surrounded by low ground there is danger that the buds will be killed by freezing. We had an Elberta orchard that last year bore a thousand baskets of fruit to the acre except on one side which was next to low ground, and there the buds were killed. It may be that such a condition would prevail only once in a decade, but if you can avoid it, you should not set an orchard on ground that is in the least degree uncertain. It used to be that we needed good air drainage not only to prevent frost, but to prevent the rotting of the fruit, but since we have learned to prevent brown rot and the curculio, the location is not so important. Select a good strong tree and the bigger its trunk and root system the better, but you want to cut off the top not more than twenty inches high and you do not want a tree that has all the buds trimmed off to a greater height than twenty inches. Better take a smaller tree than one that has had all its buds pruned off leaving a long stalk. The trees may be set 18 x 20 feet, and sometimes they are set as close as 15 x 20 feet. Sometimes 20 x 20, or even 22 by 20, but you need open roads through the orchard wide enough for hauling out the fruit. I am not prepared to say what is the best distance apart to get the most fruit, for that

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depends upon conditions. The better the ground, the farther apart the trees can be planted. One of the biggest crops on record was grown in an orchard set 20 x 20 feet and four acres gave a crop of 10,000 baskets. The ground was strong. In setting an orchard let the character of the ground determine the distance the trees should be set. We grow a truck crop in the orchard the first, second and third years. For this purpose we plant a crop that must be cultivated and the cultivation that serves for the crop serves also for the peach tree. We do not continue cultivation after the middle of July, and after the trees come into bearing we stop using intercrops. We use cover crops that can be plowed under in the spring, and after the trees are in bearing we want to cultivate late enough to bring the crop to perfection, depending a good deal upon moisture conditions. We often cultivate until we are forced out of the orchard by the fruit. One year when the ground was dry we sent men through to hold up the limbs so that we could cultivate under them, and in this way we saved a big crop of fine fruit.

As to the fertilizers used, the first three years we fertilize the intercrops—peas, beans, cantaloupes, watermelons. For these crops the fertilizer used should have a high percentage of nitrogen and this nitrogen stimulates the growth of the tree quite enough without the use of any other fertilizer. We should use no other nitrogen until the trees have borne a crop. We use from 700 to 800 pounds of acid phosphate and muriate of potash per acre mixed at the rate of 3 parts of acid phosphate and one part muriate of potash. After the tree comes into bearing we use nitrate of soda according to the requirements of the tree, applying it after a crop of fruit has set. We use from 100 to 200 pounds per acre. The results have warranted the use of this amount. We must apply enough of everything to maintain the tree in good condition.

In forming the top of a tree we start with a low head, about 18 or 20 inches from the ground. The first year you get three or four whorls of branches. The first winter we may cut out the center, taking out one whorl of the branches. If the top starts up pretty straight, it is necessary to cut out the center in order to have an open tree. After this we do not do much trimming, or at least not till after the tree has come into bearing except summer pruning. This we do in July and we do it to maintain an open head. The reason we do not prune heavily in summer is that pruning at this time checks the root system and we want a steady growth during the season. If you trim a young tree heavily in the winter time, when the tree wakes up in the spring it will make a vigorous wood growth and if it has come to the bearing age it will produce leaf buds instead of fruit buds. After the tree is in bearing no great amount of summer pruning is needed except cutting out any dead twigs and keeping the center open to get plenty of sunlight. Our peach orchards are living longer than

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they used to, and so we renew the wood from time to time, for an old tree with new wood will produce just as nice fruit as a young tree. So we renew the head by cutting out a few limbs during the season. In this way you renew the life of the tree which is in the top rather than in the body.

Professor McCue has touched upon the subject of spraying. We use nothing but the sulphur wash for peach trees during the dormant season. This takes care of the scale and the leaf curl and assists in handling the brown rot. There is a difference in the amount of brown rot on a tree that has been sprayed with the lime-sulphur solution before the buds open and those sprayed with oil. This is the only thing we want as a winter spray for peaches. For the last year or so we have given a spraying just before the buds come out with arsenate of lead to dispose of curculio, and we do not spray again until after the shucks fall. The first spray is given for the brown rot using arsenate of lead a second time, and this is followed by another spraying in one or two weeks with self-boiled lime-sulphur. In a week or two we spray again with self-boiled lime-sulphur which makes three sprayings. Within a month of ripening we give a fourth spraying.

We plant about the same varieties mentioned by Professor McCue. We set out orchards for the money we can get out of them, and if we have a variety which gives a good crop of fruit that sells for a good price, we do not mind if the quality is not so high. We set Carman, Waddell, Greensboro, Miss Lulu and we get a crop from them and they brought as much money as the better varieties which come later. If you are sure of getting a crop every five years out of six, it is a matter worth considering. The time of ripening of the Carman is just after the Elbertas from Georgia are done, or only a few of them are on the market and perhaps they are coming out of cold storage so we get as much for our Carman as the Elbertas are then bringing. The Carman has been a high priced peach with us, and for the last three or four years has paid more than the Elberta. We have a market that is all our own for a while. Of the varieties we have been using, the Greensboro has done well, especially when there is a small crop in Georgia. The Greensboro comes in about the middle of July and the Carman the first of August. Champion has been set largely since we have found that we can control the brown rot. Then we have the Belle of Georgia, Elberta, Fox Seedling and Iron Mountain. The Fox Seedling has done us a lot of good as we get them just before the crop comes in from New York. The Iron Mountain will bring a good crop of fruit, but the price is not so good. The Fox comes in about the 10th of September and Iron Mountain about the 20th. There are lots of others that are good, but these practically fill the season. Any varieties later than Iron Mountain are likely to be injured by the September storms.

When it comes to marketing the crop the method of picking is

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determined by these low headed trees. We have few picking ladders because our trees are headed low. A low headed tree is easy to trim. easy to spray and easy to pick. The time of picking will depend upon the distance you have to ship. The longer you have to ship, the greener you must pick the fruit, as it is then less tender to handle. We pick the majority of our fruit without the use of ladders. As soon as picked we take it to the packing house where it is properly sorted and graded. We endeavor to put our fruit in the popular package, our earliest fruit in crates and our later in 16-quart baskets for the Philadelphia market.

Mr. Slaymaker—Do you have any trouble in cultivating under these low headed trees?

Mr. Barton—No, we have a side cultivator or extension head harrow and we commence early in the season to cultivate and cultivate well under the trees. With this harrow we can throw the dirt either towards or away from the tree. It is made for this special purpose at Higganum, Connecticut.

INSECT PESTS

PROF. T. B. SYMONS, College Park, Md.

Mr. Chairman, Ladies and Gentlemen:

The subject assigned me is one of large proportions, and in my remarks this afternoon I shall only be able to treat of a few insect pests and diseases that have been unusually harmful during the past season. I have just learned that Prof. Scott, who was to read the next paper will not be here, so I will include the Cedar Rust in my discussion.

In discussing the control of insect pests and diseases I hardly know where to start. I wish we could convert this into a round-table talk or symposium; then we may be able to treat of the pests that would be of most interest to those present. At any rate, I hope all will feel free to ask questions at any time.

The proper control of insect pests and diseases is becoming more and more important all the time. The grower must make it his business to learn the pests that attack his principal crops. He must study their life history and the best means of control at our command. As a general rule, it is much easier to control insect pests than diseases, for the former is usually more easily understood and effective remedies can usually be employed for their control. Suppose I should ask you what has been the most serious insect pest and plant disease on the Maryland-Delaware Peninsula during the past year? I believe

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you would answer by saying the Hessian Fly and Tomato Blight and Wilt have caused the greatest losses. These are both very old customers, and yet they have taken their toll to the extent of thousands of dollars during the past season. While this is a fruit growers meeting, I know that many present grow a large acreage of wheat, and I urge that you try to reduce the injury caused by the Hessian Fly.

HESSIAN FLY.

You probably know how to combat the Hessian Fly,—late sowing of wheat and plowing under stubble, together with growing trap strips early in fall. From observations and records, considering the latitude at various points on the Peninsula, wheat should not be sowed in the surrounding country, of the following towns of these States before the date given:

Maryland	Delaware		
Elkton	Newark	October	2- 9
Chestertown	Clayton	"	6-13
Greensboro	Harrington	"	7-14
Easton	Milton	"	9-16
Salisbury	Laurel	"	10-17

TOMATO WILT AND BLIGHT.

In the case of the Tomato Wilt and Blight, there is another story. It is believed by frequent spraying with bordeaux at the proper time, that this disease can be largely prevented. Yet I am not prepared to say that it will, because it is not at all times practical to spray a patch at the time that it is needed. Something must be done, however, to prevent this enormous loss from Blight which this great money crop of the Peninsula suffers each year. I suppose it is safe to say that not one tomato grower in ten pretends to spray his tomatoes. The plants should always be sprayed in the bed, and at least two or three applications can be given in the field before the plants become too large. Later sprayings will be necessary to prevent Blight in bad seasons and we are going to test methods for doing this the coming season. There are other conditions that I believe enter into the protection of tomatoes from Blight, and make the plants more productive, that we have not as yet been able to work out. One is fertilizer for the crop; another, vitality and resistance of the plant and general culture methods.

The Wilt, of course, cannot be controlled by spraying. This disease remains in the soil for several years and only rotation of crops can be practiced, and the use of strains that show resistance to the disease. Unfortunately, the tomato wilt has been observed in several localities in Maryland.

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We expect to give this crop much attention in Maryland during the next year, with a view of aiding the growers of this great money crop of the Peninsula.

SPRAYING POTATOES.

I also believe that we can greatly help our potato crops by spraying with bordeaux. In several tests conducted during the past year we increased the yield considerably by spraying with bordeaux mixture. I believe that growers of these important crops, such as tomatoes and potatoes will have to make it a business to spray them regularly, as do all up-to-date fruit growers spray to protect the tree as well as fruit.

In our tests in spraying potatoes, we found that lime is not comparable to bordeaux mixture in protecting the foliage from disease. In fact, at the present I would not recommend the use of lime-sulphur as a fungicide for potatoes. In a recent Bulletin, No. 352, from New York (Geneva) Experiment Station, like results have been secured in spraying potatoes. This bulletin reports that "six applications of bordeaux mixture prolonged the life of the plants almost two weeks and iincreased the yield of marketable tubers at the rate of 111.5 bushels per acre; while rows receiving six applications of lime-sulphur died earlier, even, than the check rows.

THE PICKLE WORM.

Another truck crop pest that has appeared in unusual numbers during the past year on the Peninsula is the Pickle Worm. It is called the Pickle Worm because it was first noted as injuring cucumbers, but in this region, its greatest injury has been to cantaloupe, although several reports of injury to cucumbers have been made during the past sason. While injury from this insect is periodical in our States, yet every effort should be made to destroy over-wintering pupa.

The adult moth is yellowish-brown with a purplish iridescence, with an expense of about 1 1-4 inches. It appears in late spring and deposits its eggs in the flowers, buds or tender terminals of the melon, cucumber or squash plants. The larvae may feed on the blossoms or bore into the stems. As they grow older they wander from plant to plant and bore into the fruits. A single larva boring into a melon will usually ruin the fruit. This has been the manner of principal injury in our section. The fruit thus injured is practically worthless and fermentation may soon set in, reducing it to a soft rotten mass. A single larva may thus injure several fruits.

According to Quaintance the larva reaches maturity in about two or three weeks and pupates in a fold of a leaf or other suitable covering. There may be two or three more generations of the insect in this latitude.

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A detailed study of the insect has not been made in this State, but from reports it was injurious from August 14th to October 3rd.

It is thus probable that the earliest, and hence most valuable muskmelons for market purposes will largely escape injury, although the pest occurred in early patches on the Western Shore after the first two or three pickings. It is, therefore, especially desirable for growers to make the crop as early as possible. Since the pickle worm passes the winter as a pupa in dead leaves, and trash, all such matter should be cleaned off the land and burned.

Where large plantings of canteloupes and other cucurbits are grown, the vines should be plowed under as soon as the crop has been gathered, thus preventing further breeding and causing the destruction of the insects to a considerable extent. Rotation of crops will also be advantageous. Quaintance reports that spraying with arsenicals is of little use. Inasmuch as the pickle worm shows a decided preference for the bloom of squash over the cucurbits, this plant is recommended by Quaintance as a trap crop for the pickle worm. Squash seeds should be planted at intervals of about two weeks, so that there would be a succession of flowers which attract the insects during the growing period of the melons. The infested squash flowers must be collected and destroyed so as to prevent the larvae from attacking the melons.

Prof. Quaintance states "That the success which will follow the use of this trap will depend largely upon the thoroughness with which the larvae are collected."

Of orchard pests would say that we have nothing new to offer for the control of San Jose Scale, Codling Moth or Curculio. You gentlemen are quite familiar with the remedies for the control of these pests. All are practically now agreed that the lime-sulphur is the best dormant spray for apples and peaches. It is also believed that lime-sulphur is preferable to bordeaux mixture for early fungicidal treatment of apple, with arsenate of lead.

CEDAR RUST OF APPLE.

The past season has shown that the cedar rust of the apple is a disease that is capable of ruining the crop of apples in several varieties. I know that the injury has not been so marked for many years past, if ever in the state of Maryland. In one county the past year, I believe the loss to the apple growers from this disease amounted to over $30,000. Many crops were ruined in the Western part of Maryland, and in Virginia and West Virginia.

The rust may be readily recognized by its characteristic yellowish spot on the leaf and also on the fruit. The upper surface of the spots show numerous pustules, while upon the lower surface of the diseased spot appear later fringe-toothed cluster cups. The disease

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thus attacks the foliage of apple trees and prevents them from producing normal fruit.

This disease, as most of you are aware, causes the cedar apple on cedar trees, the cedar and apple tree alternating as its host. In spring during favorable climatic conditions the cedar apple on cedar trees produces gelatinous projections, each bearing myriads of spores which are blown to the apple foliage. The closer cedar trees are to the orchard, especially to the windward, the more probability there is of injury from the disease.

It is said that the disease can be controlled by spraying with a fungicide if applied at the right time. The difficulty is in treating the orchard just at the time when the spores are being disseminated by the wind. Often times this will occur during a period when spraying is impractical. Reports of recent investigations show good results from spraying with bordeaux, and also lime-sulfur. In controlling the disease the following may be adopted depending on conditions. Cedar trees should best be destroyed if in proximity of the apple orchard. If this is not possible then if there are only a few trees the cedar apples could be cut off or the cedars may be sprayed. However, the latter has not proved very successful so far. If either cannot be done, then the varieties especially susceptible to the disease should be sprayed at the proper time. Some of the leading varieties that I have observed as being especially susceptible in this region during the past year are Wealthy, Jonathan, York Imperial, Rome Beauty and Smith Cider.

In concluding the discussion of this disease I urge that you try for the period in the Spring when the spores of this disease are dis-
for the period in the spring when the spores of this disease are dis-
seminated and treat the trees especially liable to attack.

There are several other pests that have occurrd the past season in unusual numbers that I should like to discuss, but the time limit for this discussion is about up.

In conclusion, I should like to say that the School of Horticulture, Maryland Agricultural College, which was organized during the past year, purposes studying all phases of horticulture, taking up those phases such as vegetable culture, small fruits, and floriculture and landscape gardening, which are so important on the Peninsula, and which have not been given the attention that the industries deserve. We are also now prepared to give good courses, with a specialist for each subject in these lines of work at the College.

I thank you for your kind attention.

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CEDAR RUST

W. M. Scott, *Baltimore, Maryland.*

Cedar rust is common practically all over the Eastern United States and has been known as a disease of the apple for half a century or more. Owing to its dependence upon weather conditions, however, serious outbreaks of the disease have been sporadic, occuring, as a rule, at rather wide intervals, and until within recent years it has not been considered particularly dangerous. The outbreak which occurred in 1910, resulting in a heavy loss to a number of growers in Virginia, West Virginia, Maryland and Pennsylvania, revealed the serious nature of this disease in a very striking manner. Then recurrence of the disease with even more alarming results in 1912, after a lapse of only one year, has given it rank as the most serious trouble affecting certain varieties of the apple.

It attacks both the fruit and the foliage of the apple, but the principal damage is done through leaf infections. On the leaves the disease appears as very small, pale yellow spots which slowly enlarge until a diameter of from one-eighth to one-fourth inch is reached. With age these spots become orange-colored, with small, black dots in the center. On the under side of the leaf, beneath each spot, the tissues become swollen forming a cushion on which fringed, tubular, spore-bearing receptacles, called cluster-cups, are produced. In severe cases the foliage takes on a yellowish appearance and a large per centage of it drops. On the fruit the spots are a bright yellow or sometimes greenish-yellow, from one-half inch to one inch in diameter, and frequently, though not always, bear black dots and cluster cups similar to those produced on the leaves. These spots may occur at any point on the surface of the fruit, but they are most frequently found near the blossom end. The disease extends well into the flesh, sometimes reaching the core. The affected fruit may become deformed or atrophied, but, as a rule, there is no disfiguration other than the presence of the yellow spots, and the roughening of the skin over the diseased area.

The principal injury to the fruit crop results from the diseased condition of the foliage. When the leaves become badly affected the fruit stops growing and never properly matures. This cessation of growth usually takes place when the fruit is about the size of a hulled walnut. The young fruits remain on the trees but make no further growth. Attempts have been made to force them to grow by the application of nitrate of soda and frequent cultivation. This treatment stimulates the growth of the trees and induces the production of a new crop of foliage, but it seems to have no effect upon the fruit. When the fruit is once dwarfed by the effect of cedar rust

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there seems to be no hope for the crop. For example, apple trees may become largely defoliated early in the season by leaf-spot or frog-eye, and if the weather and soil conditions are favorable for the production of new foliage the fruit, although temporarily checked, may reach maturity with only a slight reduction in size. Not so with cedar rust. This disease seems to stunt the young fruits to such an extent that they never recover. The reason for this is not altogether clear. It is a well known fact that the raw materials taken up by the roots of trees are conveyed to the leaves and are there converted into food for use in the production of fruit, woodgrowth, and buds. The capacity of the leaf to perform the function of manufacturing food is, of course, reduced by the attacks of any parasitic fungus. But this does not entirely explain the dwarfing effect of the cedar rust disease on the fruit when we realize that the leaf-spot fungus may infect even a larger area of the leaf-surface and cause more of the leaves to drop without entirely stopping the growth of the fruit. Moreover, the leaf-spot fungus kills the diseased area so that the spots turn brown while the cedar rust fungus does not kill the tissues but rather induces an abnormal growth as evidenced by the cushions formed on the under side of the leaf. It seems possible that the fungus may cause the development of a toxic or poisonous substance which is conveyed from the leaves to the fruit preventing its further development.

There are three different species of fungi involved in the production of the disease known as cedar rust or orange rust of the apple. They are closely related, belonging to the same genus, and all require two different host plants upon which to live and complete their life-cycle—the red cedar and the apple or some other pomaceous plant. One of these (*Gymnosporangium macropus*) produces the cedar rust disease on apple, Wild Crab-apple, and Hawthorn; another (*G. globosum*) produces the disease on apple, quince, mountain Ash and Hawthorn; and third (*G. Clavipes*) on apple, pear, quince and Juneberry. Although they are all capable of producing the disease on the apple, the first one mentioned is largely, if not entirely, responsible for the trouble that occurs in this section of the country.

The spores produced in the cluster cups on the diseased apple leaves are carried by the wind to cedar trees, the leaves of which they infect producing the reddish-brown, globular, pitted swellings known as cedar apples or cedar balls. The infections of the red cedar with spores from the apple take place during July, August and September and the fungus begins to grow in the tissues of the cedar branches, soon producing small wart-like growths which finally develop into the familiar cedar balls. It requires nearly two years for the full development and maturity of these cedar balls and it is not until the second spring following the infections that the fungus produces a crop of spores to be carried back to the apple.

In the spring and early summer, during wet weather, the fungus

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in these cedar apples throws out long, yellowish gelatinous projections in which comparatively large spores are borne. While still in the gelatinous masses these large spores germinate and produce a crop of small secondary spores. Upon drying these secondary spores are carried like dust particles on the wind and when lodged on the fruit or foliage of the apple they germinate, provided moisture conditions are favorable, giving rise to a fungous thread which enters the tissues and branches in every direction, finally producing the characteristic yellow or orange-colored spots. As indicated above, cluster cups are formed on the under side of the leaves and on the fruit spots, and in these are produced the spores which are carried back to the cedar trees, thus completing the life-cycle of the fungus in two years. The spores produced on the apple cannot reinfect the apple but must find lodgement on the cedar in order to continue the existence of the fungus; neither can the spores of the cedar reinfect the cedar but must be carried to the apple or one of the related pomaceous plants. Beginning about the time apple trees are in bloom, infections of the fruit and foliage may take place over a period of three to six weeks, depending upon weather conditions. In wet weather during this period the cedar apples throw out the yellow gelatinous masses in which the spores are produced, and these may dry out and swell up again several times with alternate dry and wet weather, more spores being liberated each time.

TREATMENT.

Since the apple cannot become infected from any other source than cedar balls, the natural and most effective remedy is to destroy all red cedars in orchard districts. Although cedars adjacent to the orchards are the most dangerous, those at some distance may cause infections since the spores, being like particles of dust, may be carried on the wind for several miles. Orchards with no cedar trees within a mile may be considered fairly safe from serious infections except when the conditions are unusually favorable. In cleaning up the cedars, the underbrush, fence-rows and hedges should be carefully searched for young cedars. Little cedar plants only a foot high often have cedar apples and these are usually overlooked by the orchardist. It has been estimated that one cedar ball is capable of producing 30,000,000 spores, so that one little cedar bush could furnish enough spores to infect all the orchards within a radius of a mile, provided all the conditions were favorable. This means that an absolutely clean sweep of the cedars in a given orchard district would be required to secure immunity from the cedar rust disease

Spraying for the control of this disease has not always proved successful, and many growers have been disappointed in the results. One reason for this is the fact that the infections take place during

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the period of most rapid development of foliage, when new leaves are being unfolded daily. The leaves present when the trees are sprayed may be protected, but those that come out during the interval between sprayings are open to infection unless the intervals are very short.

The writer is confident that the disease can be controlled by frequent timely applications of a fungicide. The foliage is open to infection from the time the first leaves appear until five or six weeks after the blossoms fall and new leaves are constantly coming out during this period. Therefore, in order to secure absolute protection the trees would have to be sprayed every three or four days until the danger of infection is over, but this would not be practicable. However, four or five sprayings properly timed should prevent most of the infections so that the crop would not be materially injured.

The applications should be made : (1) after the first leaves unfold, just before the blossoms open; (2) as soon as the petals fall; (3) ten days later; and (4) about three weeks after the petals fall. This corresponds with the treatment for scab and codling moth, except that one extra application to be made ten days after the petals fall is called for. Either lime-sulphur or atomic sulphur may be used, but in some very striking instances the latter has proved to be the better fungicide for the control of this particular disease.

NUT CULTURE

J. W. KILLEN, Felton.

Nut culture may seem an unimportant topic, but it is interesting to me, and I am planting nut trees not only for pleasure, but for profit. I believe that most landowners on the Peninsula should plant more or less of these trees. We have been planting nut trees for twenty years and have many different varieties. We have walnuts around the driveways and on different parts of the farm. The varieties include the English or Persian walnut, also the black and the Japan. We have also planted a good many varieties of chestnuts. The Japan walnut is one of the most interesting and profitable. The Cordiformis bears a small heart-shaped nut. The shell is thin, but full of meat and the quality is fine. The tree bears very early. The shelbark is not quite as good as the Cordiformis. We have Pecan trees twenty years old, but they have borne but very few nuts. They are ornamental and are good for shade and may come into profitable bearing when they have reached a greater age. However, I would advise planting them, especially the hardy varieties, but not the large types such as they grow in the South. I am informed that there are large, bearing pecan trees at Lewes, Bridgeville and Seaford.

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Of chestnuts we have the European, Japan and American types. The American type seems more subject to blight than the others. We have cut out from 500 to 1000 trees because of this disease. The European varieties are much less subject to the blight than the American. The Japanese seems almost entirely immune with us. The Japanese nuts are of poor quality as a rule. We have Spanish chestnuts, but the quality is poor. The French chestnuts seem to be tender in our climate. It is easy to graft chestnuts and this is the only way that we should propagate them, for then we can get nuts of excellent quality. The Japanese chestnuts come very true to name.

Walnuts are readily grafted by the ring method. The best time is the latter part of August.

Mr. Roberts—Have you a variety of the Japan chestnut that is better than an acorn?

Mr. Killen—Yes, Felton is good, and so is Kent. Delaware is better than Ridgely or Paragon. If put on the market early they bring a very fair price, from eight to ten cents per pound. I had twenty varieties of filberts, but they have all gone out with the blight.

NOVELTIES IN HORTICULTURE

J. W. Kerr, Denton, Md.

Novelty, in an unequivocal and general acceptation, is forcefully enticing, pleasingly insinuating, charmingly beguiling, universally liberal, unlimited and unrestricted in resource and relentlessly potential. No sphere of human endeavor is immune to its alluring art and influence. No intelligent human being, if wholly free from hookworm, can be wholly free from aspirations to win its favor. No industry of any kind or character, can endure without the reanimating tonic of its generating stimulus.

To successful horticulture it bears the same relation that the antiskid does to the motor car; or that Marconi's great triumph does to the ocean greyhound; or the gloriously gaudy ostrich plume to the head-dress of a fashionable suffragette. Without its inspiring and energizing influence, its tireless fostering of hopefulness, its unfaltering prodigality of resources, Faith itself would vanish in an insipid dissolution; Hope would be fossilized in the dry mold of monotony; even Charity would wither and fade into the barreness like unto the drought-parched desert. Novelty, or Newness, is the very embodiment, the quickening spirit, of progressiveism in all things that partake of human interest and christianized civilization.

Considered more especially in its intimate connection with horticulture in revolutionary achievement, if all the seething fermentation

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of all the South American patriots, including the distinguished Cipriano Castro, were gathered into a single mass, the sum would be as a boarding-house buckwheat cake beside a New York City sky-scraper.

Untiringly, onward and upward it wings its way, marking such differences as that between a Stayman Winesap, and the vile, lip-puckering little Crabs—the Adam and Eve as pictured in legends of the apple. No less marked are its successful revolutions in each and every specific line of horticultural effort. In pears, as we take a cursory glint along the misty shadows of the Past, we see the Lawrence and the Seckel standing to the front as masterpieces; again, not so far back, what it did in pears was more than a plenty when it handed us the Keiffer,—that "Gold Brick" with horticultural trimmings. How extremely prodigal it has been in greatly improved varieties of the cherry, is attested by the lavishness of its smiles upon the labors of the late Dr. Kirtland of Ohio. In plums,—novelties on novelties in phalanx deep—at much less than Parcel Post rates—have reached the recording scribe of Pomological History. With peaches,—for a while novelty was bewildered with ecstacy at the boundless possibilities, until, centralizing and amalgamating its choicest golden threads, wove them into a blushing Elberta. And so on. A dispassionate and unprejudiced review of each special type of fruit reveals analogous conditions.

What about recent achievements? What recent novelty is characterized by any special or note-worthy merit? What of special value to Peninsula fruit-growers attaches to such varieties of apples as the Rabun, Delicious, King David, Lowland Raspberry, etc? When the varietal individualisms of these fruits are properly understood—indispensably essential to the successful and full and proper development of any fruit—doubtless they will all prove profitable to a greater or less degree. This, however, is not assuming that every one planting them will confirm this estimate of their value. Many of what are termed the "New Fruits" of the present, are deservedly notable for special merit in some one particular feature. Yet it is clearly true, with apples especially, that some of the *new varieties* of half a century or more ago are, in more than a few instances, unmistakably superior. Back even so short a time as twenty-five years, requirements for the disposition of apples were radically different from the present day practices. Old usages have been left behind, and quite a goodly number of meritorious varieties have been overlooked, through and by the heavy tax and pressure upon the time of the orchardist fully to adapt himself to the changed conditions. Your Committee, impressed with this opinion, may be pardoned for asking that at least a moderate degree of consideration be bestowed on these old-new varieties.

It is pleasingly given over to the magnetic and suave tree-agent,—he with the aurora-like, and illuminating imagination, to tell you of

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the marvelous new fruits, controlled exclusively by his firm. He will *sell you* a pear grown by methods known only to his people, on a black gum stock, a cross probably between a mammoth pumpkin and a sugar refinery; or, mayhap, a peach produced by a secret, scientific blending of the cocoanut and one of Capt. Cook's north-pole nightmares; a seedless fruit of a very rich, creamy consistency, which, when eaten, makes all crooks reform. The tree-agent may tell you of these—I wonder if any of you will believe him.

This topic may not be treated in this report exactly as the honored authority that placed it in my hands desired; if so, the blame attaches fundamentally to said authority and not to the writer.

GRAPES

J. Frank Moore, Dover, Delaware.

Mr. President, Ladies and Gentlemen:

Nature is smiling upon the vineyards of Delaware. The outlook is very bright for the future growth and prosperity of the grape growing industry of The Peninsula.

In the year 1912 many of the vineyards in the Dover section produced 4 tons per acre of Concord grapes, a few vineyards produced 6 tons per acre. One vineyard of 550 vines yielded 4330 four-pound basket of grapes, another vineyard of 5 acres produced 19000 four-pound baskets of grapes, one vineyard of 4 1-2 acres produced 13500 four-pound baskets of grapes, many other vineyards produced at the rate of 3000 baskets per acre. Of course there were a few vineyards poorly cared for on which the yield was poor.

The market was reasonably good throughout the season, excepting the week of the Jewish New Year. The majority of the grape growers are well satisfied with their returns, many of them are planning to increase their acreage in vineyards, this year. Many other farmers are planning to plant their first vineyard next spring. I am safe in saying the acreage planted to grapes will be about doubled this year, in the Dover section.

Some of the oldest vineyards in Kent County are located in the Clayton-Smyrna section and are as fine vineyards as you will see anywhere. The owners of many of these vineyards are conservative people and they continue to be satisfied with the business.

The late Joseph E. Carter of Smyrna was the largest grape grower in Kent County and one of the most successful. His instructions about planting and growing a vineyard, were such that today, it is not necessary to change, even so much as the crossing of a "t" or

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the dot of an "i". He left a legacy to the farmers of Delaware which they have not yet appreciated.

Many people ask what is the cost to grow and harvest a 4-pound basket of grapes or to grow and harvest an acre of grapes. If you hire everything done, the cost will be about as follows:

Trimming vineyard, per acre	$ 3.00
Brushing vineyard, per acre	1.00
Tying vineyard, per acre	2.00
Spraying vineyard four times, per acre	5.00
Plowing, cultivating, hoeing, etc	15.00
Fertilizing, per acre	4.00
Total	$30.00

A 3000-basket crop will cost 1 cent per basket, for baskets,
Harvesting crop will cost 1 1-4 cents per basket,
Baskets will cost 1 3-4 cents per basket,

Total, 4 cents per basket, or $120 per acre. If you sell for 7 cents per basket, a low average for 1912, you clear 3 cents per basket, or $90 per acre, equal to 18 per cent on $500 per acre. Cut the yield in two, call it only 1500 baskets per acre, one half crop, the cost will then be 5 cents per basket, the profit 2 cents per basket, or $30 per acre, equal to 6 per cent interest on $500 per acre, so I claim that a vineyard is worth $500 per acre even if produces but half a crop.

This is certainly the land of opportunity, the sun shines on no land that possesses a combination of soil and climate more favorable to the production of abundant crops of Concord grapes, of unexcelled flavor, than does the land of this Peninsula.

Added to these advantages our location is within easy shipping distance of many millions of people, who are hungry for the fruit of the vine. We have a goodly heritage, we should make good use of it.

SMALL FRUITS

W. F. Allen, Salisbury, Md.

Without exception the most important of the small fruits on the Peninsula is the strawberry. It has made rapid strides and has been steadily coming to the front for thirty-five years that I remember. With the increased production that we have at this time, it would almost seem as though it would be hard to find a market for this fruit; but going back thirty-five years when during the season only a few

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cars were shipped from the Peninsula, it was no uncommin thing for the market to be glutted. I can remember distincly that twenty-five years ago shipments of twenty-five to thirty-five crates was a big shipment, and I have known a sixty quart crate to sell for twenty-five cents. There was no outlet for any large quantity. Just as soon as a shipment of any size was made, the market would go all to pieces and the commission merchant would send a telegram saying that the fruit was not in good condition and had to be dumped. Notwithstanding the increased production of this fruit we do not get any such telegrams today. The average price is better now than it was thirty-five years ago. Talking with an official of the Pennsylvania railroad a few days ago, I asked him what were the total shipments of berries from this Peninsula the past season. He replied that it was nearly twenty million quarts, or about two thousand carloads. I would not be surprised if it was found that the strawberry crop is the largest fruit crop produced on the Peninsula. If strawberry growing were destroyed or taken out of the Peninsula there is scarcely a business man that would not feel it. If the growers received five cents per quart after all expenses were paid, this crop of twenty million quarts would bring to the strawberry men $1,000,000, and to the pickers about $400,000. The strawberry crop is one of the most important crops on the Peninsula.

There has been a very great improvement in varieties during the last twenty-five or thirty years. The varieties grown today are far superior to those grown in the earlier days. In the Pennsylvania railroad exhibit now shown in this room, you will find the plant of a particular new variety that was grown and originated on the Peninsula. There are many good varieties. I would like to make one remark that would apply to other fruits as well as to strawberries, and that is in reference to buying new varieties. The nurseryman sends his agent along with something to sell, and from the nature of my business it is almost compulsory that I should keep up with these new things. So I buy everything that comes on the market. But I feel that nine out of ten of the varieties sold by agents will be some old varieties with a new name. I suppose that I now have bought one hundred of these old varieties for brand new kinds. Every farmer should try the new varieties in a small way, but stick to the old ones that do well until they find something that proves to be better.

Another important crop is the blackberry crop, including dewberries, both of which do well on the Peninsula, but they are not grown in quantities like the strawberry. The dewberry takes the lead because it is earlier than the blackberry. The raspberry is grown more or less, but for some reason it does not seem to be very profitable in recent years. I do not see why we should not grow them profitably. A new red raspberry put on the market as St. Regis is a good one if you get it true to name. I have seen it grown the past season and it

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is more vigorous and more handy than anything else that I have grown in the shape of raspberries.

I do not know that currants are grown on the Peninsula commercially. There is some room for this crop here. It is an important crop and a profitable one in the North. We have land on the Peninsula that will produce this crop and we have an opening in the market before this fruit from the north comes in, and it ought to pay well. I have grown it to some extent and when I tried to sell it locally I found that there was but very little demand for it, but it sold in Philadelphia this year for twelve cents per quart. Gooseberries are another important crop and should be grown here extensively. Gooseberries and currants have become more profitable since the pure food law went into effect because soda fountains must get their acid from these fruits. This has created a demand for gooseberries and currants. They are also used largely for canning and preserving. Gooseberries brought six cents per pound in Baltimore and at this price they can be grown very profitably. We ship in barrels. The Houghton is the most productive variety on the Peninsula, unless it is the Mountain Seedling. These two are the surest producers that I have known. The berries are comparatively small, but these varieties bear full every season. The Mountain Seedling will make twice the growth that the Houghton will. It is very vigorous but thorny. Another advantage is that the fruit does not turn red early. The fruit should be picked just before it begins to color. Growers should find out what markets will take their gooseberries to the best advantage. Of the larger fruited varieties the Downing is the best. The low price often received for our fruits when put up in good shape is caused more by improper distribution than by anything else. Refrigerator cars have done much to help us distribute our fruit. We are within reach of thirty-five millions of people and it takes a great quantity of fruit to supply their needs. There are many markets where it is hard to get fresh fruit at a reasonable price, such as people are willing to pay. We want to look up more of these markets and the possibilities are that three times as much fruit can be marketed as at present at the prices we are getting today.

STRAWBERRIES

HORACE ROBERTS, Moorestown, New Jersey.

We have been pushing the strawberry business for only half a dozen years. Before that time we raised this fruit in a small way. We have been using Italian labor on our farm for a long time, and we found that in order to hold these Italian laborers, we must raise berries. The more berries we have the more Italians we can get to

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work on our land. When we first began to raise berries, we had no market except Philadelphia, and often the price was low so that there was no money in the business as usually conducted. We decided that it was up to us to find a profitable method of growing this fruit. If you find that a crop is not paying, and you really want to raise that crop, it is your business to find a cheaper method of producing that crop. You must find out how to get more money out of the crop for the labor expended, or in other words, you must improve your methods or change them altogether until you can grow the crop at a profit.

We are now growing a good many strawberries. We set the plants very early in the season. We do not wait until the ground becomes warm. Even as early in the season as when the ground freezes at night and is sticky when it thaws out in the morning, we set plants, commencing, however, after the ground has thawed out and has dried a little. We put our men at some other work in the morning and as soon as the ground is in condition, we transfer them to the field where we are setting berries. It is well worth while to break into a day's work in order to get the plants in early and to give them an early start. We grow our berries among other crops, and in using fertilizers we consider the needs of the other crops as well as of the berries. It is safe to use a half ton of bone per acre and a liberal quantity of potash. We raise peas or beans or some other crop between the rows, and the cultivation that we give these crops helps to keep the land open and gives a nice place for the new strawberry plants to take root. We are very particular in setting the plants. We give level culture and at the end of the season, the other crops having been harvested, we have a wide matted row with only an alley to walk through between the rows. After setting the plants, we put another crop right down the strawberry row. It may be tomatoes. In this case we set one tomato plant to every two strawberry plants. The strawberries do not interfere with the tomatoes and the tomatoes do not seriously affect the strawberries. When we set the tomato plants, we give a liberal application of high grade tankage along the top of the rows, using about 600 pounds per acre. The tomatoes help keep the weeds down and while they may shade the strawberries a little, at no time do they injure them, and they help them from getting too thick. We spray the tomatoes and this helps the strawberry plants. By liberal manuring and frequent thorough cultivation, we raise tomatoes of the highest quality and at the end of the season we have a good strawberry bed, and it has not seemed to cost us a whole lot. The tomatoes have reduced the cost of the production of strawberries very materially. We mulch the strawberries with manure in the winter time, not so much for the fertilizer value as for the mulch value of the application. In March following we give them a good coat of high grade fertilizer, using from 1000 to 1500 pounds per acre. We are particular about spraying, using some kind of poison with Bordeaux

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mixture. The poison controls the biting insects and the Bordeaux mixture controls the fungus diseases.

We do not raise many varieties. We are satisfied with a few. The Superior will stand high culture. Give it all the plant food possible and the more you give it the bigger will be the yield and the finer will be the berries. Stevens Champion is later, but it is soft, and you must be careful not to over-stimulate it. The Gandy, the latest variety that we grow, stands generous treatment. Three or four varieties comprise our list and we make a particular study of each variety in order to give it the proper cultivation and the proper amount and kind of fertilizer. Raising strawberries helps us in a good many ways. Our market has grown wider and better and the business is much more satisfactory than it was some years ago. We have a committee of our grange that organized to sell fruit right at our town and ship it away in carloads. This relieves the Philadelphia market so that our home prices are higher than they used to be. It is greatly to our advantage not to bother with a whole lot of varieties. If you have a straight carload of a single variety of berries, and the fruit is known to be in good condition, a whole carload can be sold at a fair price, while a mixed car containing fruit of different kinds and of different qualities might not sell. I had a little experience last year that illustrates this point. One day I was notified by the Exchange not to bring any Chipman berries on that day, but when the exchange learned that I could load a solid car of Chipman, there was no difficulty in selling it. The exchange would take a carload, but it would not take a dozen crates. So having a whole lot of one variety, you have a much better chance of getting a good price for the fruit.

We pick our beds two years. As soon as the field is picked the first season, we put in a gang of Italians and pull the weeds out quickly. Last year we tried another method and simply mowed the weeds off and threw a furrow over the beds. This seemed a little rough treatment, but the plants soon came through and it was easy for the Italians to pull out the weeds that were not killed at comparatively little cost.

HORTICULTURAL EDUCATION

C. A. McCue, Delaware College.

Horticulture is perhaps the most specialized of all branches of agriculture. Its successful practice calls for a vast amount of special knowledge that would be of no use to the ordinary farmer. The very fact that such special knowledge is necessary for the successful practice of horticulture has placed the horticultural industries in the hands

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of a highly intelligent class of men. The ignorant man, or he who will not learn, and is self sufficient unto himself, seldom makes good in any field of Horticulture. He soon falls a victim to nature's ruthless law of the survival of the fittest. Horticulture must be approached with an open mind. While the average horticulturist may be from Missouri and has to be shown, he doesn't have to be shown twice.

Orcharding, small fruit growing, vegetable growing and flower growing are all divisions of horticulture and each calls for its special knowledge. Of these various branches, floriculture perhaps calls for the most *intensive* knowledge of the laws governing the processes of plant life. From the very bigness of his subject the grower of tree fruits *must* be a big man. He usually becomes a leader in his community and, take it all in all, he represents the most advanced type of American farmer. Fruit growing regions are noted the country over for the intelligence and progressiveness of their inhabitants. Show me a man who knows how to grow good fruit and how to put it upon the market, and I will show you a man who is wide awake and "up and coming" in all those things of life that we call progress. The stand patter is a rare bird among fruit growers.

If the fruit grower of today needs to possess a vast amount of special knowledge to conduct his business, how much more so will the fruit grower of the future be in need of a broad fundamental training in agriculture. Up to the present time the majority of our leading horticultruists have gained their knowledge thru the hard school of experience. True much useful and necessary knowledge can be accurately acquired only in that way. One learns how to properly prune an apple tree only by pruning many apple trees. One learns how best to grow chrysanthemums only after growing many generations of chrysanthemums. Nevertheless there are many facts and fundamental principles of pruning and of growing chrysanthemums that can be learned without going thru the long school of experience. By their learning we may shorten the period of apprenticeship. Are we are not justified in striving to learn these fundamental principles, thru reading, conversing, etc. that we may the more quickly become a good grower of trees or an expert grower of carnations.

It is this view of the subject that justifies the existence of schools of Agriculture and Horticulture. No Agricultural college can turn out an expert horticulturist after four years of study. A business world does expect them to turn out men who are grounded in the fundamental principles of business. The fruit grower should not expect our schools and colleges to graduate men as successful horticulturists. But they have a right to expect, nay a right to insist, that such schools give their students good, sound, business-like instruction in the fundamental principles underlying the growth of plant life. They have a right to expect that these schools teach their students how to apply these fundamentals to every day life upon the farm and

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in the orchard. They have a right to insist that the tools be placed in the student's hand, that he be taught their uses and their interdependence upon each other. Whether or not the student becomes an expert in the use of these tools which have been placed in his hands, and which have had their construction and uses explained, is a problem of individual ambition and adaptability.

A graduate of an agricultural course may not be an expert in the *how* of things; but he should be an expert in the *why*. *How* comes thru practice, *why* comes thru knowledge and reason. *How* should be subservient to *why*. If we know *why* we may reason out *how*. Clear thinking and logical reasoning compose the macadam surface on the road to success. It is not what we learn that makes us successful; but our ability to apply that knowledge to our every day affairs. Learning to think and reason for one's self opens the windows of a man's soul.

Let us briefly consider some of the ways in which horticultural knowledge is being disseminated in the United States at the present time. In every state in the Union there is an agricultural college and every one of these colleges is offering some sort of a course in Horticulture. The amount of instruction offered in the various states varies greatly according to the importance of the horticultural interests in those states. For example, Cornell University in New York offers four more courses than does North Dakota where the horticultural interests are of but little importance. Some institutions stand out above others as to the scope and completeness of their courses in Horticulture. For example, Illinois, Michigan, Cornell and Massachusetts are placing great emphasis upon their horticultural courses, Pennsylvannia State College, Iowa State College, and Ohio are rapidly coming to the front. Maryland has just instituted a School of Horticulture, Oregon ranks at the head of the Pacific Coast institutions and California is taking on a new lease of life. Throughout the South there is a strong awakening along the lines of horticultural instruction with North Carolina leading.

In our own institution at Delaware we have not as yet had a sufficient number of students to justify the setting apart of a specialized course in Horticulture. Today at Delaware College all agricultural students pursue the same course of study regardless of their leaning toward any particular branch of agriculture. Notwithstanding all this, two-thirds of the men graduated at Delaware in the last three years are engaged in horticultural work. As soon as the number of students justify it, the course must be divided and the boy who wishes to engage in horticultural pursuits given a chance to specialize along the line of his chosen profession. Until this has been done we must not complain if our boys go elsewhere to obtain their instruction in horticulture.

At Delaware College at the present time there are offered 18

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hours of instruction in the horticultural department, divided as follows: Plant Propagation, 2 hours; Pomology, 6 hours; Vegetable Gardening, 3 hours; Plant Breeding, 3 hours; Landscape Gardening, 2 hours and Farm Forestry, 2 hours. In the total number of hours given we rank with or above Colorado, Florida, Kentucky, Missouri, Nevada, New Jersey, South Carolina, South Dakota, Tennessee, Vermont and Wyoming.

The greatest number of hours offered by any institution is 126 in the University of Illinois. There they have 27 1-2 hours of Pomology; 25 1-2 hours of Floriculture; 21 hours of Landscape Gardening; 4 1-2 hours of Small Fruits; 2 hours of Plant Breeding; 5 hours hours of Plant Propagation; 10 hours of research work; 2 1-2 hours of Pruning and Spraying; 11 hours of General Horticulture; 2 1-2 hours of Nut Culture, and 4 1-2 hours of Evolution of Cultivated Plants. The total number of hours of horticultural instruction offered in all of the agricultural colleges in the United States is 1533 2-3 while the average per state is 31 1-3. This average is divided as follows: Pomology, 7 1-2 hours; Floriculture, 3 1-2 hours; Landscape Gardening, 5 1-4 hours; Vegetable Gardening, 2 hours; Small Fruits, 1 1-9 hours; Plant Breeding, 5 1-30 hours; Plant Propagation, 1 4-5 hours; Research work, 2 4-5 hours; Spraying and Pruning, 6-7 hour; General Horticulture, 2 1-9 hours; Nut Culture, 1-5 hour; Horticultural Literature, 1-2 hour; Evolution of Cultivated Plants, 5-8 hour; and miscellaneous, 5-12 hour. These figures do not represent the ideal course; but they give one an idea as to present teaching of horticulture in the United States.

Again returning to Delaware College we find that one of the greatest drawbacks to proper horticultural instruction is lack of greenhouse facilities. At the present time the College is without a green house and until it obtains one the work in Plant Propagation, Vegetable Gardening, Landscape Gardening, and Plant Breeding will be seriously handicapped. No work in Floriculture can be offered until green house facilities are available.

Doubtless the present legislature will be asked for a small appropriation for the purpose of constructing green houses at Delaware and your aid is asked for in assisting the legislature to see the proper light.

Each state in the Union possesses an Agricultural Experiment Station, and in the majority of these important horticultural work is being carried on. The prime function of the experiment stations is searching for fundamental truths. The demonstration of the proper application of these truths is properly a function of the extension division of the Colleges. Every extension division of every Agricultural College in the land should publish monthly bulletins of information. These bulletins should be shorn of the technical terms which must necessarily be used in experiment station bulletins. These

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monthly bulletins should be supplemented by timely newspaper articles from time to time. Every effort should be made to reach all of the people all of the time. An Agricultural College should never forget that it is a public service institution and that its duties do not cease at the College gate.

The farmers' institutes should be closely co-ordinated with the Extension Division of the Colleges. Special institutes of timely interest should be held from time to time. Schools should be visited and the children interested in Horticultural work.

Agriculture and Horticulture should be taught in the public schools; the reasons for this are so evident that I will not weary you with a discussion of them. Every country school should have land available for school gardens and every school district should have moneys available as prizes for the best gardens of each year. By the use of school gardens there can be inculcated into the heart of every child a love for the land that can be wiped out only by the hand of death. "Back to the Land" is the slogan of today. Start a school garden in every rural school and the term will become obsolete within the next generation.

The country newspapers also have their part to play. Sad to relate the majority of them are not living up to their opportunity to serve their farm readers. We need a real live up-to-date horticultural and agricultural newspaper on this Peninsula. Such a paper should deal with conditions as they are found in Delaware and upon the Eastern Shore. Who will start one?

Lastly, one of the greatest agencies for distributing horticultural knowledge and of awakening interest and enthusiasm in things horticultural is the meetings of our Horticultural Society. They don't come often enough. We ought to have a summer field meeting once in a while.

We should bend every effort toward having a good fruit show each year. We can spend our money to no better advantage. We have a duty to perform in educating the public to know and appreciate good fruit when they see it.

MARKET GARDENING

G. J. MEREDITH.

We are strongly of the opinion that no state is more favorably situated than this Peninsula for making a successful issue of growing a great variety of vegetables and fruits for market. We have the variety of soil, accessibility to the best markets of the world, and the climate to constitute an ideal market garden. It is a well demon-

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strated fact that different vegetables require different qualities of soil. The soil that would produce a paying crop of Irish potatoes is not the best for sweet potatoes. We have such a varied soil texture that we can grow not only the white and sweet potato, but also any and all the varied list of market vegetables. Then when we consider the possibility of increasing the productiveness of our soil and the ease with which it can be done, we have a telling factor in our favor as gardeners for market.

One of the first things to impress one who looks into the subject is the conviction that our gardeners lack perception. We are in old ruts. While the markets are expanding, we are standing still. We are trying to content ourselves with the old, and the markets are demanding something new. There is not the intelligent catering to the tastes of the people who buy the things we grow. There was a time when an indifferent article put upon the market in an indifferent package in an indifferent condition would bring a price that would make the growing of it profitable. That time is past. Go into what market you please, east, west, north or south, and you will find that the demand is for a fancy article put upon the market in the pink of condition and in an attractive package, and it must be a standard package.

It is for this reason that Delaware is in grave danger of losing her prestige as a peach growing state, and she can never hope to take her place as a garden state until the people use their gray matter to find out what the market wants and how it wants it. Another impression we get is that our gardeners seem to think that if you feed your market with pork and cabbage for dinner and it takes kindly to it, all you need to give him for supper by way of variety is cabbage and pork. It is a fact that any good product creates an increasing demand for more in kind, but we need not infer from this that if we have grown onions and found an increasing demand for onions, that city folks can live by onions alone.

There is an increasing demand for all staple and fancy garden vegetables and fruits. Somebody is going to be paid for supplying this growing demand. Then why not the Peninsula market gardener? He occupies that enviable niche where he can come in between the South and New Jersey, and the profits are for him if he will arise to his opportunities. To do this he must not be afraid to launch out into new fields and try new things; study soil and learn what it will grow best; apply himself to the task of growing a perfect article and then give as much attention to putting it upon the market as he did to producing it, and he will have no fear of hard times.

What is the outlook; what of the future for the Peninsula market gardener? Is this growing demand for quality, quantity and variety to continue, or will the city worker, under the stress of the high cost of living, learn to simplify his tastes and go back to the "pork and

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beans" age? The outlook as I see it is for an increasing demand for the staple and fancy vegetables. The cities are becoming more populous each year. The wage of the worker tends upward and so long as the laborer has the price, his table will be supplied. Our lands are becoming more valuable every year. We are beginning to see that it is a losing game to grow the crops we once grew. They will not pay the interest on the increased price of our land. Hence the tendency is for more intensive cropping and to grow those crops that yield most per acre. Two things we need to do: Learn the taste of the man we would feed, and feed him. The first of these is simple, the second will test our mettle, but there is pleasure and profit in the task.

MARKET GARDENING

GEORGE MORRISON.

There are periods in the history of every country when the study of Agriculture becomes more urgent, and as that country acquires a vastly superior importance, the necessity for better cultivation is every day becoming more apparent. Agriculture now is vastly more important to us than it was 50 years ago. The land must be better tilled, its special qualities and defects must be studied and means must be gradually adopted for extracting the maximum produce from every portion susceptible of cultivation.

This State, by reason of its advantageous geographical position, with good transportation facilities and its thousands of acres of land admirably suited to vegetable culture and so susceptible of improvement is destined to become, if not already, one of the leading Horticultural areas in the country. The growers of Delaware are within the distance of the large markets of the Eastern States in which individual marketing can be successfully accomplished, although there is no doubt regarding the advantages and desirability of co-operative selling and buying for that matter. This is a day of organized effort in all lines, and the Horticulturists are beginning to awaken to the advantages to be gained from co-operation. The necessity for co-operation depends largely upon the distance from the markets and the character of the products to be shipped. When the cost of transportation is moderate, and the produce not perishable, it is generally more satisfactory for the grower to ship individually and create a market for his own product.

Experience and example encourage us to look forward to still further improvement in the art of culture, and independent of such as may be derived from purely mechanical principles, chemistry

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has done much and still points the direction in which important advances may be reasonably anticipated. The art of culture, indeed, is almost a chemical art, since nearly all its processes are to be explained only on chemical principles. When you add lime or other fertilizing elements to the soil you must demand from the chemist a reason for the increase in crop yields which follow the application. In fact the greatest light has been thrown upon the art of culture by the researches of organic chemistry. Soils differ much as regards their immediate origin, their physical properties, their chemical constitution and their agricultural capabilities, yet all soils, which in their existing state are capable of bearing a profitable crop, possess one common character, they all contain organic matter in a greater or less proportion. This organic matter consists chiefly of decayed vegetable substances. The proportion of organic matter in soils which are naturally productive of cultivated crops varies from 50 to 70 per cent of the whole weight.

Though, however, a certain proportion of organic matter is always found in a soil distinguished for its fertility, yet the presence of such substances is not alone sufficient to impart fertility to the land. Nevertheless, in the vegetable growing industry the question of organic matter or humus in the soil is of great importance. Without its presence in abundance the soil is dead or inactive, and while a soil is void of humus you cannot look for remunerative crops. Its presence improves the mechanical properties of the soil, assists in the retention of soil moisture, provides for the activity of soil bacteria, and improves the chemical properties. Without the proper proportion of organic matter in the soil, you cannot look for the maximum benefit of fertilizers applied. Humus furnishes food for bacteria, these acting on the humus change nitrogen to nitric acid so that it is ready for plant food. Another extremely important function of humus is that it encourages the growth of bacteria that fix free nitrogen from the soil air, rendering it available as a plant food; the more air in the soil the more rapidly the humus is decomposed. Some soils under cultivation, especially when large quantities of either barn yard or green manure are used, become charged with an excess of acid; which has a detrimental effect upon the nitrogen gathering bacteria. An application of lime will correct or neutralize the existing acidity.

There are two ways by which the organic matter of the soil may be augmented, by the application of manure and the ploughing under of green crops. Those of you living near Philadelphia and other cities of less importance, or those whose transportation facilities are adequate, I presume, can most cheaply provide the necessary vegetable matter to the soil, in the form of manure. Others who are less favorably situated to procure in abundance manure from the city must turn your attention to green manuring. Every farmer and vegetable grower is familiar with the crops best suited for the pur-

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pose. But I venture to say that too little attention is paid to this phase of agriculture in this, as well as in other states.

The vegetable growers around London and Liverpool, England, apply far heavier applications of manure than I have seen applied in Maryland. In London nearly all the horses are bedded with a peat litter, which is an excellent absorbent. In fact, peat litter can absorb from three to four times as much as an equal weight of straw. Therefore, you can readily see that most of the liquid manure so rich in nitrogen, reaches the farm instead of running off into some drain, producing phenomenal results, adding large quantities of humus and fertilizing elements to the soil. So fine is this peat litter manure that it can be applied immediately before planting a crop, which cannot be done with undecomposed straw manure except, perhaps, in fall, owing to the fact that a heavy application of coarse manure when ploughed under will most likely interfere with the capillary action of the soil.

For crops that occupy the soil but a short time, such as radishes, beets and lettuce the application of manure should be well decomposed or available, while for crops occupying the soil the whole summer it is of less importance that the manure should be immediately available.

The question of the distribution of manure is worthy of consideration. It is well to apply as much of it as possible as it is hauled from the source of supply, thus saving a second handling, and loss of nitrogen during decomposition if not sufficiently consolidated and watered, and by the heavy rains washing from the pile nitrogen in the form of ulmate and humate of ammonia.

The value of manure, especially horse manure, varies in proportion to the degree of attention its preservation has received, and in part to the quality of food consumed by the animals. Again, poultry manure, so rich in nitrogen and deficient in other elements, can be wasted in its application if not supplemented with both phosphates and potash.

The characteristic and highly beneficial effects of farm yard manure upon the texture of soils are due to the organic matter, and its mechanical effects are perhaps not less important than those which depend upon its chemical composition, and on this account it is considered by many to be practically indispensable. If, however, it cannot be obtained in sufficient quantity to maintain the necessary supply of humus in the soil, recourse must be made to green manure and the supply of plant food can be supplemented by special concentrated fertilizers.

The vegetable growing industry of this State, as well as other states, is often handicapped for want of sufficient moisture. No other plant grower is so dependent upon weather conditions as the grower of vegetables, his crops are more easily affected by drought and the summer heat than any other crop of economic plants.

Furthermore, he cannot confine his planting to the spring and fall

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months when the soil is usually charged with sufficient moisture to germinate and care for the young seedlings. He is sewing and planting every month from early spring to late fall, thus he often entertains difficulty during the dry months of June, July and August in getting seeds to germinate and young plants to grow. Crop yields are undoubtedly governed more by the presence or absence of water than by any of the other elements that enter into plant life.

It is more universally diffused throughout nature than any other chemical compound with which we are acquainted and performs most important and diversified functions in reference to vegetable life. Its presence is absolutely necessary before any other plant food becomes available, not only because of its solvent power but it acts as a carrier or medium by which all elements essential to the growth of plants are conveyed, except those which pass through the leaves. Its importance, therefore, is well established, and the result of its presence in insufficient quantity has, I am sure, been apparent to all of you, perhaps, frequently.

The question of humus, and the question of soil moisture are interlocked, inasmuch as the presence of an ample supply of humus has the power to retain water. A soil deficient in humus cannot hold water for any length of time, and its surface is always susceptible to packing or baking, especially after heavy rains, thus permitting the loss of soil moisture. Again when a soil lacks humus in the proper proportion the physical condition of the soil is not susceptible of producing quality in vegetable production. The rapid fluctuation of the moisture content of the soil affects or interferes with the food supply of plants which tend to dwarf and harden the tissues of the plants.

To effectually provide against drought at all times, there is but one way, and that is to irrigate, using the overhead system, generally known as the Skinner system of irrigation. This system is rapidly gaining favor among the truck growers in New Jersey and other Eastern sections. The expense of installing the system is not great when you consider its possibilities. The insurance against the effect of a dry season is practically perfect. You can render the soil sufficiently moist in a dry time to plough and otherwise cultivate, to prepare for the immediate reception of seeds and plants. You can sow seeds any day you desire with the assurance that they will germinate and that plants will grow. You have the moisture question under complete control, and it may be used to protect crops against frosts in spring or fall.

The preparation of the soil for the reception of crops is a very important matter, and when possible the major portion of the cultivation should take place before the crop is planted, for deep cultivation after the crop has made headway or filled the soil with roots frequently reduces crop yields much by the cutting of the roots and the waste of moisture.

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The size of the soil particles affects all the soil activities, and the size of the soil particles influence the water-holding power of the soil, the amount of food that can be dissolved for plant use, the ease of movement of air and water, the growth of soil bacteria, and the crop producing power.

This emphasizes the necessity of thorough cultivation before planting, and that the whole body of ploughable soil should be thoroughly pulverized. This may best be done when the soil is neither wet nor dry. In order to thus render soil in which truck crops are to be grown, it is well to plough or otherwise cultivate deeply, immediately ploughing a second time and again cultivate, thus reducing the whole mass to fine particles. A mellow seed bed is indispensable to the maximum development of the roots of young seedlings to reach out unhindered in every direction, preparing them for the fuller accomplishment of their purpose when the store of food within the seed becomes exhausted and the further tillage as the crop grows, which should be shallow, will, besides retarding the growth of weeds aerate the soil and prevent the escape of moisture by evaporation, and render it in a better condition to absorb subsequent rains. The depth of tillage should be governed in part by the crop to be grown. When crops with fleshy roots are to be grown, such as salsify, parsnips and potatoes, it is specially important to secure an open texture in order that the rapidly expanding tubers may not find undue difficulty to move the soil aside and to retain their normal shape, which ultimately is important indeed, when they reach the market.

Some vegetables should reach the market before maturity while others should be fully matured. Carrots, radishes, beets and turnips should, for instance, be placed on the market in their young and tender stage of development, while others such as potatoes and cabbage improve as they mature.

The fundamental necessities for quick growth and quality are a plentiful supply of available plant food, and an abundance of vegetable matter. For this very reason does virgin soil produce abundantly, and only do they retrograde in this respenct in proportion to the gradual decrease of humus.

For some kinds of farming, great farms are best, but for specialized products it is intensive farming that pays.

I am rather in favor of specializing in the culture of vegetables. Better grow a few crops best suited to the soil, give your attention to the crops that pay you best, for others will find remuneration in crops less profitable to you. In Long Island they have phenomenal results with cauliflower. The climate seems to be favorable to the growth, but their requirements are perfectly understood and applied, and here in Delaware you might derive phenomenal results from some other crop. If so, that is the crop to grow. Sometimes the phenomenal yields are not a matter of soil or climate but the understanding of

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the requirements of the crop in question. Perhaps if you were to treat cauliflower as they do in Long Island in some part of your state you might derive exceptional returns. Cauliflower requires much manure and much water in order to produce size and quality.

Again, from a section of Michigan comes fine celery that appears to be produced in part at least, by the peculiar character of the soil. The soil is of a peaty nature, rich in humus. And it may be chiefly a question of water after all, for celery is not unlike cauliflower in respect to water, and it may be attributable in part to the specialization and the full knowledge of the requirements of the crop. Asparagus is a crop that does not get the general attention here that it deserves, and is one of the vegetable crops that is perhaps least understood. I have never seen asparagus here comparable with that which comes from France to be sold in the London market. Though any well drained soil containing plenty of humus will grow asparagus, a rich sandy loam is best. Before planting a crop it is economy to fertilize heavy, plough deeply, and cultivate thoroughly. Perhaps there is no vegetable with the exception of the potato that is consumed in such quantities as the lettuce. Especially does this apply to the hotel trade. The demand for this product is great indeed and not less so is the demand for quality, and those producing a fancy product will have no difficulty in disposing of it at remunerative prices. The heads must be firm, tender and crisp and well blanched. And next in importance to the head lettuce is the cos lettuce. They are grown as is the head lettuce but as they do not form naturally a firm and compact head, the head has to be tied together in order to blanch the inner leaves. Rhubarb is not generally treated as a crop as it should be. What is wanted in rhubarb is tender and crisp light pink colored stalks, with less acid content than the content of that grown in the usual way.

In England and France all rhubarb of quality that is not forced out of season, is shaded or grown under cover. I have seen acres of it treated in this way. Rows of posts placed in every second or third row, about 4 1-2 or 5 feet above the ground, on the top of which are nailed scantlings, making a continuous line as it were. Then at right angles to, and upon these supports are placed light timbers or scantlings to carry the covering of straw or other material. Here the rhubarb produces more stalk of superior quality and less leaf, and all winter long this product is forced in hotbeds or cellars and under greenhouse benches. Rhubarb thus treated is lifted in the fall after the tops have died down and allowed to freeze, which seems to improve its forcing qualities.

Supplementary to vegetable culture outdoors, and a branch of the business that might with profit be enlarged, namely—the forcing under glass during winter. This branch of the business receives, perhaps, more attention in Massachusetts and Rhode Island than any

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other section with which I am acquainted. Arlington and Belmont, near Boston, and Providence, R. I., perhaps lead in this respect. There large quantities of lettuce, cucumbers, beets, radishes and tomatoes are forced every winter and are perhaps the leading crops, together with cauliflower, with lettuce or radishes between the rows.

It is recommended by some that houses for growing vegetables should have less slant than hose for the use of florists. However, I fail to see the advantage of such an arrangement, but would recommend the truss construction in preference to pipe supports. The truss construction gives a free interior so that the plow, harrow and carts can be used within, saving much manual labor. The heating may be either hot water or steam. There is not much difference between the two systems in regard to fuel consumption. Both systems are good when properly installed, but the installation has much to do with the effectiveness of any system.

SWEET POTATOES

H. C. Thompson, U. S. Dept. of Agriculture.

The sweet poatato is becoming more popular each year and the production and value are increasing rapidly. Not only is the total acreage and value increasing but the yield and value per acre and per bushel are increasing rapidly. This is due in a large measure to better methods of storing and marketing, permitting the crop to go on the market when the price is high, and also to the increasing popularity of this vegetable. The total value of the sweet potato crop in the United States in 1909 was $39,429,000, being 78.3 per cent greater than in 1899. 95 per cent of this crop comes from 16 States. Compare the increasing value of the crop with the increase in acreage and it will be seen that the value has increased in greater proportion than the acreage. The acreage in 1909 was 641,000 acres, while in 1899 it was 537,000. The yield for the United States in 1909 was 59,200,000 bushels, and in 1899, 42,500,000 bushels, or an increase of 39.3 per cent in 1909 over 1899. The increase in value is twice as great as the increase in yield. The value per acre in the United States has increased from $36.98 in 1899 to $55.25 in 1909, and the value per bushel increased from 47 cents in 1899 to 60 cents in 1909. The yield per acre has increased from 79.1 bushels in 1899 to 92.4 bushels in 1909. Now let us compare the value and yield in a few of the States with the average of the United States. In acreage and production North Carolina ranks first with 84,740 acres yielding 8,493,283 bushels, or at the rate of 100.2 bushels per acre. Georgia ranks second, with 84,038 acres yielding 7, 426,131 at the rate of 88.3

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bushels per acre. Alabama ranks third, with 66,613 acres yielding 5,314,858; Louisiana fourth, Mississippi fifth, South Carolina sixth, Virginia seventh, Texas eighth, Tennessee ninth, Arkansas tenth, New Jersey eleventh, Maryland sixteenth and Delaware seventeenth. In yield and value per acre, New Jersey ranks first with 141.6 bushels; Delaware second, with 140 bushels; Maryland third, 134 bushels. The yield runs on down to 64 bushels per acre in Texas. The total value in New Jersey in 1909 was $1,527,074; in Delaware, $276,679; in Maryland, $483,751. The value per acre in these three States ranges from $60 to $70, but, of course, the good growers get more than this.

IMPROVEMENT IN CULTURAL METHODS.

While the yield of sweet potatoes is higher in this section than in any other sections of the United States, there is still chance for im provement. It would not be expecting too much to expect an aver age yield of from 175 to 200 bushels per acre among the commercial growers. This increase in the yield could be made without much additional labor and expense, so would mean additional profits to the grower. The value of the product could be increased by better meth ods of curing, storing and marketing. The first place for improvement is in growing the plants. In some sections diseases cause great injury and reduced yields, and, as some of these are carried from the storage house to the bed and from the bed to the field, greater care should be exercised in the bedding. The seed tubers should be carefully examined and all those showing any disease thrown out. The disease may live from season to season in the propagating bed so that fresh soil should be used each year, or the soil thoroughly sterilized. Diseased tubers should never be thrown on a manure pile or on land that is to be put in sweet potatoes. The best method is to burn them, but if they are buried deep in the soil no injury will result. Where disease is prevalent, sweet potatoes should not be planted on the same land year after year. In fact, it is a good plan to have a system of rotation with sweet potatoes coming on the land not more than one year in three. One of the best ways to keep the crop free from disease is to grow the seed from vine cuttings on land that has not grown sweet potatoes for several years.

PREPARATION AND CULTIVATION OF LAND.

The method of preparing the land is very important. The surface soil should be 6 to 8 inches deep and underlaid with a subsoil that will carry off the excess moisture. A soil which is loose or having no subsoil will produce long, irregular potatoes that are not desired on the market. On soils having a deep surface soil shallow plowing should be practiced so that the soil will be firm beneath, causing the roots to force themselves through.

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MANURES AND FERTILIZERS.

On sandy soils that are lacking or low in humus, stable manure is recommended as a fertilizer. Heavy applications of fresh manure, however, a short time before planting will stimulate growth of weeds and vines at the expense of the tubers. It is much better to use well rotted manure at the rate of 10 to 15 loads per acre either broadcast or in furrows under the sweet potato row. Where barnyard manure is not available, a leguminous crop should be grown on the soil to supply humus. Crimson clover planted in corn will answer the purpose.

Where commercial fertilizers furnish plant food, it can be applied at the rate of from 500 to 1500 pounds per acre. A fertilizer analyzing from 5 to 6 per cent of nitrogen, 7 to 8 per cent phosphoric acid and 8 to 10 per cent potash is very good for sweet potatoes. The grower can save money and be sure of what he is getting by buying the ingredients and mixing them himself. While ready-mixed fertilizers of any desired formula can be secured, we do not always know what is the source of the different elements, and practical growers know that potash from some sources is better than others. The same is true of nitrogen and phosphorus. For example, the nitrogen in tankage is not as available as that in nitrate of soda, sulfate of ammonia, cotton seed meal or blood. One can usually save five or six dollars a ton by mixing his own fertilizers and he knows what he is getting. A great many people hesitate to mix their own fertilizers because they believe there is some scientific mystery involved. This is not the case. It fact, it is quite simple when once understood and is based on simple arithmetic. Suppose one wants a certain formula, as for example, 8-4-8, which means 8 pounds phosphoric acid, 4 pounds nitrogen and 8 pounds potash to every 100 pounds of the fertilizer. Then in one ton we would have twenty times 8 or 160 pounds phosphorus, 20 x 4 equals 80 pounds nitrogen and 20 x 8 equals 160 pounds of potash. We will supply the nitrogen by nitrate of soda and the problem is how much nitrate of soda will be required to furnish 80 pounds of nitrogen? Nitrate of soda usually analyzes about 15 per cent nitrogen, so divide 80 by 15 and multiply by 100 and we get 80 divided by 15 equals 5.3 times 100 equals 533 pounds nitrate of soda. Phosphorus may be furnished by 16 per cent acid phosphate. The amount of phosphorus needed is 160 pounds, so divided by 16 and multiply by 100, which gives 1000 pounds as the amount of acid phosphate needed to supply 160 pounds of phosphorus. Potash may be furnished by muriate of potash, which contains about 50 per cent potash. 160 divided by 50 equals 3.2 times 100 equals 320 pounds muriate of potash required.

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533 lbs. nitrate of soda
1000 lbs. acid phosphate
320 lbs. muriate of potash

1853 lbs.

This gives only 1853 pounds of mixed fertilizer, but it has the same plant food that is contained in one ton of 8-4-8 mixed goods. What would the dealer or mixer do? He would add 147 pounds of filler and you would pay the freight on that much worthless material and pay $5 or $6 for mixing and bagging.

HARVESTING.

Probably the greatest problem in connection with sweet potato work is the storage of the crop so that it may be put on the market at the time of the year when the price is high. Sweet potatoes can be sucessfully stored and kept through the winter if they are well matured, carefully dug and handled, free from disease and put in a house where the temperature can be controlled. In harvesting, sweet potatoes should be dug so that the bruising and cutting is reduced to a minimum. For this reason a potato digger with the carrier attached is not to be recommended. The most satisfactory digging implement is a type of plow with two rolling colters that cut the vines ahead of the plow. The moldboard does not turn a furrow, but has a number of rods fastened on the moldboard which separates the potatoes from the soil, or the moldboard is extended. Where no special digger is available, an ordinary turning plow may be used by attaching a colter to the beam.

The potatoes should be dug when the soil is fairly dry and the weather is bright so that the surface moisture will dry off before the potatoes reach the house. The potatoes should be allowed to remain on the ground an hour or two before being picked up. The practice of throwing several rows of potatoes together is a bad one as the potatoes become bruised. The best method is to pick up the tubers direct from the row into padded baskets and load these baskets on a springwagon to be hauled to the storage house and there dumped carefully into bins. This reduces handling to a minimum, and the least the potatoes are handled the better they will keep. I believe that potatoes should be sorted in the field to some extent so as to eliminate the extra handling that would be necessary if they were sorted at the house. When gathering, first go over the rows and pick up all the marketable size potatoes except those that are cut and bruised, then pick up all of the very large and very small and the injured ones. These should be placed in separate bins.

The secrets of success in keeping sweet potatoes are, as men-

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tioned before, thorough curing and keeping the potatoes at as near uniform temperature as possible after they are cured. In order to thoroughly cure sweet potatoes it is necessary to have a building in which artificial heat and thorough ventilation can be given. In the curing process the important thing is to get rid of the excess of moisture, and this can best be done by applying heat and giving good ventilation. While I believe that a temperature of from 80 to 90 degrees is the best for the curing process, I am thoroughly convinced that getting rid of the moisture is more important. In other words, high heat without ventilation will not cure sweet potatoes, and I would rather have good ventilation and a temperature of 70 to 75 degrees than insufficient air circulation and a temperature from 80 to 90 degrees. Our work and studies convince us that the humidity of the air in the house is one of the important factors favoring the development of diseases in the storage house.

When the potatoes are put in the house, the ventilators and windows should be open and heat applied. The objects are to raise the air temperature higher than the temperature of the potatoes so that the air will absorb the moisture, and to get rid of this warmer moisture-laden air by means of thorough ventilation. For this purpose ventilators through the ceiling are important. The length of time required to thoroughly cure will depend upon the condition of the potatoes at the time they reach the house and upon the atmospheric conditions. It will require longer to cure when the weather is cloudy or in rainy weather than when the days are bright. Under ordinary conditions 10 days should be long enough to keep the temperature up to 80 or 90 degrees. With a little experience one can soon tell when potatoes are cured. When sprouts begin to appear one can be sure that curing has gone on long enough. After the curing process is over the temperature should be reduced gradually to about 55 degrees and kept as near that point as possible throughout the remainder of the storage period. If temperature is higher than 55 degrees it is advisable to open the house for awhile in the morning to get the temperature down. Or if the temperature goes too low, by opening the house during the middle of the day the temperature can be raised, provided the outside temperature is higher than the inside.

During mild days the ventilators may be opened, but should be kept closed at night and on cloudy or rainy days so as to keep out the damp air. Whenever the temperature goes as low as 48 degrees heat should be applied and when it reaches 60 degrees the house should be cooled off by opening early in the morning, or when the temperature is low enough. For best results you should not allow the temperature to vary five degrees. Nothing causes decay as rapidly as fluctuations in temperature. For this reason it is essential to have storage houses that will not be affected to any great extent by outside temperatures.

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CONSTRUCTION OF STORAGE HOUSES.

The material used in building the sweet potato storage house is not so important as the method of building. Brick, stone, concrete or wood may be used and give good results if the building is properly constructed. The essentials of a good storage house are: First, that it be so constructed that the temperature inside will not be influenced by slight changes in outside temperature. Second, it must be built so that thorough ventilation can be given when needed and can be closed up almost air-tight when desired to keep out outside air.

Where wooden houses are used they may be built somewhat as follows: Make a foundation of stone or cement and on these lay 2 x 10 sleepers 2 feet apart. Over these sleepers nail plain boards, then a layer of heavy building paper and over this a layer of matched flooring. The walls can be built by placing 2 x 4 or 2 x 6 uprights 2 feet apart, either on the floor or upon the foundation. Over these uprights nail on rough boards diagonally on the outside, then put on a layer of heavy building paper and over this nail matched siding. On the inside of the studding put on another layer of boards diagonally and over this put building paper, then a layer of matched lumber or wainscoting. The ceiling should be made as tight as the floor and may be constructed the same way. The roof may be tarred paper, Paroid roofing, slate, shingles, tin or corrugated iron. Many storage men put shavings or sawdust between the inside and outside walls, but this is not a good practice. The dead air space is better than any material one can use, for it is a non-conductor of heat and cold. The sawdust or shavings take up moisture and when once wet will never dry out, thus keeping the walls damp. Storage houses should be provided with windows and ventilators sufficient to get a circulation of air in all parts of the house. A house 20 x 40 and 8 or 10 feet high should have 3 windows on each side and at least one in each end and 2 ventilators through the ceiling and roof. It is also a good plan to have a number of trap ventilators in the ceiling so that they can be opened without exposing the room to outside air. These would open into the space between the ceiling and the roof.

The house should be built wide enough to accomodate one, two or three rows of bins. A convenient width is 20-22 feet inside measurement, giving two rows of bins about 8 feet long with a four-foot passageway between the rows. The arrangement of the bins with reference to convenience and air circulation in all directions is very important. There should be an air space around the wall and under the bins. A satisfactory and simple way of making the bins is as follows:

Lay 2 x 4's on edge on the floor and on these lay 1 x 4 inch boards with an inch space between to allow air circulation below and up through the potatoes. For the sides and back end of the bin set up

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2 x 4's at the corners of the bin and half way between the corners. Over these 2 x 4's nail slats or boards leaving a 1-inch space between boards. It is a good plan to slat up both sides of the 2 x 4 uprights so as to leave an air space between the bins. It is also a good plan to nail cleats on the side of the bin at the center and cut boards to fit in so that the back half can be filled before putting any potatoes in the front section. Nail cleats just inside of the front edge of the bin so that movable boards can be put in as the pile is built up.

There are two types of bins in common use—one the deep bin and the other the shallow bin or shelf arrangement. Our experience leads me to believe that there is very little difference in the two types and that the extra expense of the shelves and the extra labor of putting the potatoes on the shelves is not justified. Where the potatoes are well matured and properly cured they will keep in bins 6 to 8 feet deep, but I would not recommend the large bins in use in some of our storage houses. A good size bin is 4 to 6 feet wide, 6 to 10 feet long and 6 to 8 feet high.

Some storage house men have used boxes and hampers for sweet potato storage and have had good results. In fact, some people believe that better success has been secured where these have been used than with the bins. The advantages of the box or hamper over the bin are, first, less handling, consequently less bruising; second, when a potato rots in a hamper it affects only that hamper, while a decaying tuber in a bin may affect all in that bin.

Whatever method of storage is used, the potatoes should not be disturbed until ready to market. Even if rot begins it will do no good to sort the potatoes over and pick out the diseased tubers. In fact, the results secured in one or two tests would seem to indicate that it is best not to pick out the diseased ones, because handling bruises the tubers to some extent and distributes the disease throughout the pile of potatoes. A diseased potato may be in contact with 5 or 6 sound tubers and distribute the spores to that many, while if they are sorted over each one of the five may come in contact with as many more and cause them to decay. Most commercial storage men are agreed on this point and advise not to move sweet potatoes under any conditions until ready to market.

After the sweet potatoes are thoroughly cured they are ready for market whenever the prices are high.

The grading and packing for market should be done with great care. It would be the height of folly to go to the expense of building storage houses for properly curing and storing sweet potatoes and then put them on the market in anything but first-class condition. The secret of securing high prices for a product is to properly grade, clean and pack it and put it on the market at the proper time. Sweet potatoes should be clean and well graded and sorted before putting into the container. Two commercial grades are usually made. The

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large or unusual shaped potatoes go into "pie stock," and are sold to restaurants and hotels. The other grades usually known as "primes" consist of medium size, uniform tubers, and go to the best trade. This grade would not bring a good price unless separated from the "pie stock."

The type of package used is not so important provided it is clean, neat and attractive. However, the small size package is becoming more popular each year, and a great many sweet potatoes are sold in the 5-8- and 1-bushel hamper. The bushel hamper and the barrel are used to a large extent for sweet potatoes. In summer the veneer barrel with a burlap cover is often used, while for winter shipment a flour barrel with a solid head is to be preferred. In winter the barrels should be covered with heavy building paper to protect from cold, and a lining of paper is often an advantage. Whatever method is used, the potatoes should be protected from the cold, for a chilled sweet potato will not keep. In mild weather the bushel hamper and the veneer barrel are the most desirable, while for cold weather the

To summarize briefly the essential points in sweet potato storage: double-headed barrel or the bushel box are the best.

Sweet potatoes to keep well must be well matured, carefully handled, thoroughly cured and kept at a uniform temperature during storage.

Good ventilation is absolutely essential in a storage house in order to get rid of surplus moisture.

Keep temperature of storage house about 80 to 90 degrees F. until the potatoes are cured and as near 55 degrees as possible after that.

Grade the potatoes carefully and put up in neat attractive packages. Be absolutely honest in packing—do unto others as you would have them do unto you.

SECONDARY CROPS IN THE ORCHARD

HORACE ROBERTS.

In the discussion of secondary crops, we must bear in mind that they are just what the name implies. If you are growing secondary crops in an orchard, the orchard comes first all the time, and whatever is raised in it must be secondary and not the orchard. Unless you are willing sometimes to tear out your truck crop you should not plant truck crops in an orchard. Unless you are willing to put the orchard ahead of everything else, you are taking a great risk. You should be ready to drive over your truck crop or do anything else to it to save the orchard. If you get a truck crop a little close to a tree, the tendency of the workmen is to try to save the plant rather than the

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tree. You have to look pretty close to your farm help or they will skin some of your trees, and I try to impress the lesson upon them that I would rather skin my nose than to skin a tree. It is necessary to take special pains in the orchard. We can learn a whole lot by studying western conditions. Most of us farmers need an income from the beginning of planting our peach orchards, and we can get it by using secondary crops in the orchards. Many growers pay but little attention to secondary crops. They call them robber crops. But this argument does not appeal to a man just starting in the business. He wants an income at once and the cash that comes from these intermediate crops should pay the cost of growing the orchard. To have a profitable orchard you should give it ideal conditions in the beginning. That statement may be right, but it does not always appeal to the average man when he is starting an orchard and at the same time must do something to make a living. First let us see what is the ideal treatment of the orchard. It should be put in a good mellow condition early in the season, given clean culture until the middle of July or the first of August and then follow this by a cover crop. That is my notion of what is an ideal condition. Now to secure this condition, the best way is to raise in the orchard crops that do not interfere with securing this condition. There are lots of crops that will put our orchards in good shape and keep them so all the time and still give us returns. The orchard has to be tilled and it does not cost much more to farm it with a crop in it than without one, and you get an income that helps out very much in paying bills. There are some crops that should not be grown in an orchard. Take for example the most injurious crop to the orchard—the oat crop. You get the land thoroughly tilled and put in oats and they start off in fine shape, but along in June the oats take all the moisture in the soil and give the trees a check that they are not likely to get over. Apple trees may get over it if they are stunted, but a stunted peach tree is ruined forever. Oats may be recommended as a fall cover crop, but not as a forage crop, for it is about the worst forage crop that we can grow in an orchard. Wheat and rye are not quite so bad as oats. Wheat and rye and all these forage crops may be sown in the fall as cover crops and they will take the moisture out of the soil when it is not needed, but when it should be taken out to allow the tree to ripen its wood so that it goes into winter quarters with hardened wood and it comes out all right next year. We have a lot of crops that do no harm in an orchard, but are really an advantage. Leguminous crops are an advantage. Peas and beans properly fertilized and properly tilled will do your orchard a lot of good. Till the land early in the year and keep on farming while you are gathering the crops. Till the peas and beans every time you pick them. There are lots of crops that do not interfere with the growth of the orchard. Whether you should grow them is simply a matter of cost and income. If you can put in

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a crop and take it off and make money out of the crop while you are keeping the orchard properly tilled, you have gained just so much. Early cabbage is a very good crop, for you have to keep them well tilled and they come off in time to be followed by a cover crop. Late cabbage is not quite so good, especially after the orchard comes to bearing age, for late cabbage have to be tilled at the time the tree should be ripening its wood and making fruit buds for the next year. Sweet potatoes are an ideal crop. They are not tilled in the latter part of the summer, the trees ripen their wood before the ground is stirred in digging the potatoes, so that this last working of the ground does no harm. White potatoes are a good crop. Berries cannot be recommended. It would be all right to plant currants and gooseberries when the orchard is set except for the fact that you must take them out about the time they reach their best condition and they are worth too much to do that. Blackberries are the worst of all. You decide to save your berries and you lose your trees. Strawberries may sometimes be grown, but I would not risk it. The matter of growing these intercrops is entirely a matter of expense. If you cannot do it at a profit, then leave the orchard bare except for the cover crops. With our nearness to the market where we can sell everything that we raise, these crops tide us over until the trees are ready to bear. We are able to pay for the land and for the orchard with the crops that grow between the trees before the orchard comes into bearing. Times are changing and our planting conditions are changing. We are planting closer together than formerly, we head lower, and so our period of intercroping will be shortened.

Mr. Barker—Have you any experience with vetch as a cover crop?

Mr. Roberts—Yes, we find vetch very good. Last fall was almost Ideal for crimson clover and if we could always get Delaware grown crimson clover seed, we would be sure of a satisfactory stand, and I should prefer it to vetch. But there does not appear to be enough Delaware seed to go around.

Professor McCue—Orchardists in at least a part of Delaware I am sure will find much in Mr. Robert's methods of intercropping that they can apply in their own orchards, and to their very great advantage.

FERTILIZERS

W. G. Dawson, Cambridge, Md.

This subject is so large, so important, so complex, that a brief paper can touch only a few points. Volumes have been written, with more to follow, as greater knowledge is acquired and wider experience had. Earnest men are constantly seeking for more light, and

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are generously giving out information as it is gathered by them. Every farmer should keep up with this subject as zealously as does the attorney with new laws. Agriculture is essentially a science. The power of knowledge is now very generally recognized by agriculturists, and hap-hazard farming methods are becoming impotent in competition with scientific work of intelligence.

That which renders fertile, or rich, is, strictly speaking, a fertilizer, and includes all materials used by farmers for such purpose. However, it is usual to apply the term to commercial manures, and here it will be so construed.

Commercial manures are used to supply plant food, whereby larger yields may be obtained. The primary reason for taking on this large item of expense is so to increase the crop yield as to decrease the cost, per measure, of production, thereby adding to the net profit. This is the key to intensive culture, the only really sensible and correct method, and which must be eventually adopted in the East.

In order that a commercial manure may prove a wise investment, it must contain plant food that is readily available during the period of growth of the crop on which it is used, and must be in such proportions as tend to produce desired results. In short, crops should be fed a well-balanced ration. To select wisely it is necessary to have an intimate knowledge of the soil to be cultivated as well as a correct understanding of the habits and requirements of the crop to be grown. Otherwise fertilization can be nothing more or less than chance.

Proper fertilization is full of meaning. To approach an understanding of it, careful study, close observation, and practical experience are required. The underlying principles of plant feeding furnish the foundation of this science—and truly it is a science, intricate and profound, to feed plants properly. Even after the basic principles are mastered each farmer mush work out his individual problems for himself, as conditions vary with every farm, and with every field.

After all possible points have been duly considered, and the question of fertilizer selection is reached, not only should the analyses be regarded, but the sources of such analyses be most thoroughly inquired into. The forms of plant food are of the greatest importance. If the plant food contained in a commercial manure is not in available form, it is not worth the handling, to say nothing of its price.

Another point should never be overlooked in the selection of a commercial manure: no brand of fertilizer carrying a small percentage of actual plant food is an economical proposition. It means a too large proportionate cost of handling, bagging, transportation and application, to plant food received. Of course, the nitrogen, phosphoric acid and potash must have some container, yet it must be borne in mind that the more concentrated the manure, the less is the proportion of the container accompanying the plant food. In goods

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having a low content of plant food, not only is the container present in larger quantity, but usually a so-called "filler" is used, uselessly adding to the cost to the manufacturer, to be ultimately paid for by the farmer. Materials containing any, or all, of the above mentioned three principle items in insoluble forms are of no value, as plant food must be soluble that it may be available.

Further, a commercial manure may contain a certain percentage of soluble plant food in a really desirable form, or be actually deleterious. For instance, kainit contains potash in a desirable form, while its large content of chlorine prohibits its extensive use on certain crops. Dissolved rock, bone black, and animal bone may be too liberally treated with sulphuric acid, and, in consequnece thereof, there be remaining a sufficient amount of free sulphuric acid to prove directely injurious to a crop, or indirectly, because of its tendency to encourage fungus troubles, or its destructive influence on the bacteria necessary to the vigorous growth of the clovers.

Whenever a commercial manure shows the green light of caution or the red danger signal, it behooves the intelligent and careful farmer to observe the warning. If a manufacturer refuses to inform the would be purchaser of the materials used, or to be used, in the goods offered, this might rightfully be regarded as a caution signal. The user has a perfect right to know all the sources of plant food in the goods he buys—the proportions being the manufacturer's secret. If it is a case of the old story of "gold dollars at ninety cents," this will appear as a red light to any one not color blind. Yet be it said to you, farmer friends, there are many instances where you are at fault in your methods of buying, in the not infrequent cases of placing too much importance upon the price, thereby tempting the seller to cut prices to a point where cheap materials must be substituted in order to avoid a loss in the transaction. Truly it is a difficult thing to beat the other fellow at his own game! If you cannot find a manufacturer in whom you have confidence, and to whom you are willing to pay a sum that will yield him a legitimate business profit, then purchase your materials and mix your own manures. However, it is not intended now to take up the subject of purchasing fertilizers, although its importance eminently entitles it to serious consideration—more serious than it generally receives. This problem is being worked on and it is believed that it will be satisfactorily solved in the near future.

The interest in tree fruits on this Peninsula is resulting in a wonderfully important industry, and the achievements of our leading orchardists have been, and are being, told by the magnificent displays of fruits at our annual meetings. These exhibits eloquently speak the story of a marvelous development in horticulture, for which, to a great measure, is due the intelligence, the enthusiasm, the indomitable courage, and the progressiveness of so many of the veteran members

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of the Peninsula Horticultural Society. The names of many of them deserve to be written into the history of our two States, for their examples and their works are responsible for the phenomenal development of our Peninsula.

The dominant thought in the minds of all true orchardists is to improve upon what now is. It will be admitted that feeding the trees has not received as much attention as has improved and advanced methods of spraying, pruning, and cultivation. Yet these very things, increasing the health of the trees, produce a splendid appetite for food in abundance.

Beginning with the newly set orchard, there is the desire to produce the greatest possible healthy growth, so that when the trees reach the fruiting age, there shall be the largest possible bearing surface. To obtain the best results an abundance of plant food must be readily accessible. The judicious use of fertilizers, containing the food in well-balanced proportions, will induce a rapid growth of healthy wood. This is the period when the trees should be liberally supplied with nitrogen and phosphoric acid, together with potash in sufficient quantity to meet the greater need of it due to the very rapid growth. No particular analysis is here suggested because of varying conditions, and particularly owing to the fact that large quantities of nitrogen are now being furnished through the agency of the legumes. The amount of nitrogen to be supplied by a fertilizer obviously decreases as the amount from the legumes increases. The point is, to feed the young trees so as to obtain the greatest amount of steady, healthy growth up to the time fruiting is well begun.

When the trees come into bearing it becomes necessary to feed for something more than vigorous growth. It is important to supply liberally the required food, readily available, to enable the trees to mature a crop of fruit as near perfection as can be, with a sufficient surplus for the proper growth and maturity of new wood for subsequent fruiting, and the continuation of such a robust, healthy condition as to assist the trees to resist disease. At this stage an increased proportion of potash is recommended, the potash derived from high grade sulphate of potash being preferable, it being free from chlorine, thus avoiding all deleterious effects therefrom. It is believed that a wise and liberal annual application of a proper fertilizer will, barring severely adverse weather conditions, insure a crop of fruit every year, and without shortening the life of the trees.

This method of fertilization has been very thoroughly and most successfully tried out on orange groves in Florida, hence our Peninsula orchardists should not regard it as being experimental.

The returns derived from the use of commercial manures depend much upon the physical condition of the soil which is to receive them. There must be free access for the oxygen of the air to promote those chemical changes necessary to make the plant food available. When

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oxygen is present in abundance the chemical changes are more rapid and more complete. Therefore, soil that is well supplied with humus offers the best reception to fertilizers. Yet such a favorable condition of soil will not avail much if the tillage is neglected, permitting the soil to become encrusted, thus excluding the air and allowing the waste of water that should be conserved by frequent cultivation, for the use of the plants. As a matter of fact better results may be obained by very thorough cultivation without fertilizer, than from the use of fertilizer with neglected cultivation. Fertilizers play an important part in crop returns only when properly selected and wisely used. There can be little doubt that fertilizers have crippled some farmers, and even ruined a few, but it must be admitted by all students of the subject that failures to realize profitable results are, apart from calamities of weather, traceable to either a mistaken selection of the fertilizer, or to the neglect of the user to do his part subsequent to the application.

This is the time of the year for taking under consideration the matter of fertilizer selection. Do not delay it until the rush of spring work is at hand. Think over what crops you have to look out for during the coming season; with care study their needs, to the end that they may be enabled to yield the best returns; and be prudently liberal in providing for them, just as is done for the live stock. Remember that you cannot force a plant to utilize food in violation of Nature's laws, and that the application of insoluble matter is a wanton waste of time and money. Use your knowledge—scientific and practical—and, too, your well paid for experience, in an effort to make every pound of commercial manure used prove a good investment.

COMBINING POULTRY AND HORTICULTURE

C. L. Opperman, Berwyn, Maryland.

It is an honor to address such an audience as this. You have just listened to a talk by Mr. Roberts on secondary crops in the orchard. The little hen is a secondary crop and one which I believe can be well included with our orchard business. The orchard may be the main proposition, nevertheless the hen may be a valuable aid in the production of such beautiful fruit as I have just looked over in the exhibition room. I congratulate the Society upon the beauty of this exhibit.

A few years ago I knew a gentleman who combined poultry with horticulture and after two or three years with the poultry in the orchard, he told me that the quality of his fruit had come up wonderfully. The hen in the orchard adds to the fertility of the soil, picks

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up the bugs and the worms and helps to make the fruit of superior quality. The orchard is an ideal place for the hen and fruit growing and poultry keeping go well together. The orchard affords shade and other advantages to the poultry, and the hen adds materially to the profit of the fruit grower.

The practical points in poultry keeping are about the same whether we keep the hen in the orchard or out in the open field. The breed that one should select depends upon the taste and the desires of the owner. It is the man behind the apple that gives it quality. It is the man that makes the business a success. It is the man behind the breed that determines the success of the breed in poultry keeping. Select the breed you like, the one that fills your market conditions. The White Leghorn is in the majority in this country, especially among people who keep poultry for eggs, but recent contests have shown that no one variety of poultry wins year after year in the egg laying contests. Sometimes it is the White Wyandotte that takes first place, and again it is the Plymouth Rock, and again it is the Leghorn. So, for mere egg production there is no one best breed. Take one of the small Mediterranean breeds like Leghorn or one of our American breeds like Plymouth Rock or the Wyandotte, and you can have successful and profitable egg producers if you meet the conditions of success with the breeds that you select.

We have our poultry farm where we keep about 2500 laying hens, and we also keep a breeding flock which are kept separate from the layers. We have one house that holds 1500 laying hens and this house is set right in the midst of the orchard, between two rows of bearing trees; and we consider this an ideal place for a poultry house, and we consider the hen an ideal animal to run in the orchard. Of course we must keep the ground tilled and we must keep the trees sprayed and pruned; the orchard must have good care and attention. But we want to grow something in the orchard for the poultry and so after we have plowed and harrowed the ground we sow oats; and they come up quickly and grow rapidly because the droppings of the poultry have made the ground rich. Then when the oats are a few inches high, the hens eat them off and it is surprising to see how much feed these oats will furnish to the hens and how rapidly the trees grow and how wonderfully they bear fruit of the highest quality and in the greatest quantity. We allow our breeding stock a wider range than we give our laying hens and as we do not have orchards large enough for them all we let the breeders roam over the corn fields and the [illegible] fields. We have divided the main farm outside the orchard into [illegible] fields of 12 acres each and we practice a rotation of crops on these fields, but allow the breeders as wide a range as possible on them. The object of giving the breeding stock this wide range is that we may have a strong healthy stock from which to rear our birds. In this way we keep the disease down. In fact we have almost eliminated disease from

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our flocks by breeding from these birds that get plenty of fresh pure air and plenty of exercise and plenty of food of the kind that makes bone and muscle and frame. All these things give health and a strong constitution. It is just as bad and just as wrong to crowd chicks as it is to crowd fruit trees. If we plant peach trees or apple trees too close together we will not get large, high colored, good flavored fruit. If you crowd breding hens into a small space and then tell people what an enormous amount of money you have made off of a few square feet of ground, and then sell for a high price the eggs that are laid by hens that live in this over-crowded condition, you sell a great lot of eggs that will hatch poorly and produce a lot of chicks that are weak and sickly, and then people have been cheated. It is a temptation to sell such eggs but it is not a good policy in the long run and it gives the poultry business a blackeye. By breeding up our stock to healthfulness and strong constitution, and in egg laying capacity and habit, we have been able to make our 2500 hens pay us $5000 annually. We stick to the principle of shipping eggs only from the well bred birds that are strong and healthy. Hens with weakened vitality cannot produce eggs that will hatch out into chicks that will make heavy crop. This is an all-important matter in building up your flock of laying hens. You cannot take a hen out of her natural environment, coop her up in a small space and expect her to produce 150 eggs per year, and then have these eggs fertile and capable of hatching strong chicks.

The chickens are kept in the brooder house for six weeks. They are then put out in the colony houses in the orchard where they have plenty of sunshine and air and yet are able to have the shade of the trees. If weeds have grown up in the orchard after cultivation has ceased, they can have the shade of the weeds. Or if you have put in cover crops like crimson clover, they can pasture on this clover and if there are not too many of the chickens they will injure the clover very little after it has once a good start, and they are constantly picking up the worms and bugs and adding to the fertility of the soil. By hatching from eggs that are strong in vitality, by brooding the chickens in a clean sanitary place, giving them proper feed, plenty of air and sunshine even while they are in the brooder house, just enough heat, but not too much, then growing them to maturity out on the range or in the orchard, you will have producing hens that cannot help giving you a good profit. In conclusion I want to say, don't go into the chicken business unless you love it. If you do not like to see the hen around the place, to hear her sing, to watch her as she goes on the nest to lay, and if you do not love to hear her cackle when she comes off the nest, don't go into the poultry business. Don't go into it in a half-hearted way. The poultry business on a commercial scale is as difficult as the apple business and requires the same degree of study and attention.

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ALFALFA FOR THE ORCHARDIST

DR. RICHARD S. HILL, *Director*, Farmers' Institutes of Maryland.

It is a great pleasure for me to be over here in Delaware today. I was so anxious to see you, fruit growers, and your exhibit, that I left the Farmers' Institute to take this little trip to your meeting. Your exhibit is magnificent and shows what can be done in any line of agriculture by the farmers of Delaware and the Eastern Shore. There is one thing, however, that surprises me, and that is that you all seem to be bachelors for I take it that if you were married you would bring your wives with you to a meeting like this. Those of you who have wives should surely have them accompany you to meetings of the Horticultural Society, to the Grange and to the Farmers' Institute. Bring them and let them become interested in horticulture.

Although this is purely a horticultural society and general farming is somewhat out of place, I want to talk to you a little while about alfalfa, and incidentally say that I think it would be a good plan for you to bring alfalfa to your horticultural meeting, and especially to the exhibits at your State Corn Show, which I see you are holding in this building at the same time that you are holding your horticultural meeting. Fruit growers ought to be interested in alfalfa for it is one of the best crops that you can grow. Fruit growers are doing more thinking, more studying and more planning than any other set of farmers that we have. They take the lead in agriculture and they should take the lead in growing all kinds of farm products as well as growing fruit. The up-to-date fruit grower should take the lead in every line, and you should produce on your own farm the food that is necessary for your live stock, your teams, your dairy cattle and to a large extent your poultry.

Apple growing is a good business and it is a true adage that says, "An apple a day will keep the doctor away." But you should grow something else besides apples. It is possible to grow apples and alfalfa successfully on the same land at the same time. Neither will interfere with the other. But most of us have room on the farm to grow all the food needed for the live stock without going into the apple orchard. All kinds of farm animals eat alfalfa, and they all need it in their daily rations. I do not know of any food that will do as much good as alfalfa that can be grown with so little cost. The large dairymen in the dairy centers where they are leaders in agriculture and in dairying, grow great big crops of alfalfa, and we in our section of the State made up our minds we could do the same thing.

Alfalfa is not a hard crop to grow. In the first place you want a soil that has grit enough in it to be well drained, and you want a man on the land that has grit enough to be successful in growing any other crop. If you have not grit enough in your make-up to be suc-

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cessful in the crop that you are now growing, you will fail in growing alfalfa. There is not a single county in Maryland, nor in Delaware, where alfalfa cannot be grown successfully and profitably. In fact it is grown in every county now. Some of our farmers are growing large crops of it and increasing their acreage every year. It requires a fertile soil and yet any soil that will grow an ordinary crop, if it is a well drained soil, can be made fertile enough to grow alfalfa. You must have a well drained soil, and the soil must be sweet, and have an excess of lime in it. Alfalfa requires more lime than any other crop and besides that, the soil itself must be made alkaline by the use of lime, for alfalfa like other legumes will positively not thrive in a sour soil. Some legumes will do fairly well in a soil that is neither decidedly sour nor decidedly alkaline, but alfalfa requires an alkaline soil. You also want good seed; fresh seed that will grow and is free from weed seed and dodder and all other kinds of adulteration. In Virginia they had a pure seed law years ago, and seedsmen and seed merchants dumped their impure seed, their old worthless seed, down on us in Maryland. Now we have a pure seed law in Maryland, but you have none in Delaware. You should see to it that you have such a law enacted by your legislature now in session at Dover.

In selecting a field for alfalfa, it is a good plan to have a field that is in crimson clover now. Plow that clover down in the spring and keep the ground thoroughly tilled until August. Put on fertilizer if necessary, and if any manure is used, put on old compost that is free from weed seed. Begin with three or five acres and make a success with this amount and increase it as fast as you wish. When the crimson clover is plowed under, plow a little deeper than the ground was ever plowed before. Put on a little more lime than you ordinarily put on, say from 25 to 30 bushels of slaked lime, or from 12 to 15 bushels of fresh burnt lime, or 30 to 40 bushels of ground oyster shells. Work the lime in thoroughly. The last week in July or the first in August, you will be ready to sow the seed. If the land is not in crimson clover, the next best thing is to sow cowpeas early, having plowed the ground as soon as it is ready, work it at the proper time, put in some quick maturing variety of cowpeas, and along the last week in July cut them off for hay and as soon as the cowpeas are off, double disk the field and work it up until you have a first class seed bed. Set the disk straight so that they will help make the soil firm. You will then have an ideal seed bed that is full of moisture and that will keep moist whether it rains or not. When you get ready to sow the seed, get a load of soil from some field where alfalfa has been growing for two or three years or more, a field that you know is inoculated with the bacteria that makes nodules grow on the roots of alfalfa plants. Spread 250 to 300 pounds of this soil to every acre that you are going to put into alfalfa, and when you put it on be careful that the surface of the ground is moist, and that the soil that

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you are putting on is moist, and then be sure that it is worked in to the ground before it has time to become dry. You want this soil not simply because alfalfa has grown in it, but because it contains the germ that enables the alfalfa to get its nitrogen from the air. Sunshine will kill this germ, and so you want to be careful to handle it so that it will not dry out until it has been thoroughly worked into the surface of the soil. In hauling it to the field, the dirt should be covered with bags. It should have a harrow run over it directly after it is spread to cover it and work it into the soil. Nothing destroys this germ quicker than sunshine. Then, as I have said, get good seed, have it tested and put on from 20 to 25 pounds to the acre, sowing one-half of it one way and working it in rather deeply, then sow the other half the other way and cover it lightly. You should not sow alfalfa seed later than the 10th of August. Don't cut it the first fall and don't pasture it until it is two years old. Many crops have been ruined that way. Along towards spring you can sow on a little more seed if you find it needs it. By the last of May the alfalfa will be ready to cut. One rule is to cut as soon as you see the first blossoms, but a better rule, perhaps, is to cut it as soon as you see a second lot of shoots beginning to come out at the base of the plant. It must be cut at this time or you will injure the second crop and weaken the plant. Cut it and dry it and get it off the land. You will have a lot of trouble if you have not been successful with the inoculation. Occasionally the field should be disked, setting the disk straight so as to split the crowns of the plants and not cut them off. Cover the field occasionally with a good coat of well rotted manure, also add lime from time to time, but don't put on the lime immediately after applying the manure. Your land may also need an application of 300 or 400 pounds of dissolved South Carolina rock, or a good dose of bone meal. Cutting with the disk harrow is a great advantage and should not be neglected. It lets in the air and sunshine and kills the weeds, and the working greatly increases the crop. Any crop that will yield four cuttings a season and make five or six tons of the finest hay must be well taken care of, and it deserves to be well taken care of. So don't fail to manure it and don't fail to lime it and cut it at the proper time. It is very much more valuable than timothy. Grow all the alfalfa you can and keep it on your own farm and if you sell any hay sell the timothy.

The feeding value of alfalfa is equal to the feeding value of wheat bran and you all know how important a food wheat bran is to the dairymen. If we grow alfalfa, and feed it, we do not need to buy much concentrated feed. In connection with alfalfa you should have silage. I know from personal observation that alfalfa grows well all down this Peninsula and you can grow it as well as it can be grown in Maryland or New Jersey, and I want some of you active fruit growers to take up this matter and set a good example to the other farmers.

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J. W. Killen—I can endorse all that Dr. Hill has said and confirm the statement that alfalfa can be grown almost anywhere in Delaware. I am entirely successful with it on my sandy land in Kent county, Delaware. I get four cuttings per year and it grows to an average height of about three feet, and I find that my ten acres in this crop is one of the most profitable parts of my farm.

GOOD ROADS

LOGAN WALLER PAGE, *Director,*

Office of Public Roads, U. S. Department of Agriculture.

The most remote point in the State of Delaware and the several counties of Maryland and Virginia embraced by the Peninsula Horticultural Society is less than two hundred miles distant from fourteen cities of more than 50,000 population each and six cities of more than 300,000 each, the aggregate population of the twenty cities, according to the 1910 census, being more than nine millions (9,028,557). Your territory, therefore, lies within easy access of practically one-tenth of the population of the entire country and at the very gates of the greatest market center of this country and possibly of the world.

Your facilities for reaching these markets are excellent. The entire peninsula section is fairly well traversed by railroads, and these are supplemented by water routes afforded by numerous rivers and creeks and the Delaware Bay on the east and the Chesapeake on the west. Added to this, your climate and soil conditions are eminently adapted to trucking and fruit growing, and are hardly surpassed in this respect by any other section of our country. Your situation thus appears unusually favorable to the profitable growing of horticultural and truck products on an extensive scale and we would expect your section to make great progress in the utilization of all available area for productive purposes.

Notwithstanding these favorable circumstances, however, if I may indulge in a little friendly criticism, I do not find upon investigation, that you have made as great progress as I had anticipated. For instance, in reviewing recent census figures, I find that the value of all farm property in Delaware in 1900 was little more than forty million ($40,697,654), which had increased in 1910 to sixty three million ($63,179,201), or 55.2 per cent; but of the land in farms that which was improved had decreased from 70.7 per cent in 1900 to 68.7 per cent in 1910, or two per cent. In the nine Maryland counties embraced by your Society I find that the value of all farm property in 1900 was a little more than fifty million dollars ($50,104,

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634), which had increased in 1910 to eight-two million ($82,700,087), or 65.05 per cent; but of the land in farms that which was improved had decreased from 66 per cent in 1900 to 64.88 per cent in 1910, or a little more than one (1.12) per cent. In the two Virginia counties I find that the value of all farm property in 1900 was eight million ($8,673,681), which had increased in 1910 to nineteen million ($19, 301,053), or 122.52 per cent; and of the land in farms that which was improved had increased from 54.4 per cent in 1900 to 54.7 per cent in 1910, or three-tenths of one per cent.

In the matter of population, I find that while the entire territory embraced by the Peninsula Horticultural Society showed an increase of 6.72 per cent for the period from 1900 to 1910, yet in Delaware one county showed a decrease of one-eighth of one per cent and four of the nine Maryland counties showed an average decrease of 6.06 per cent, the two Virginia counties for the same period showing an average increase of 15.06 per cent.

Thus it appears on the whole, that you have made gratifying progress, yet your progress has been somewhat restricted and its continuity broken by a tardy county here and there. I shall not undertake to analyze the reasons for this condition further than to say that one of the principal contributing causes may be found in the fact that in 1909, the latest figures available, only 4.96 per cent of your roads were reported as improved.

The business of farming and the development of the agricultural resources of a section of country are essentially dependent upon the condition of the public roads. Whatever may be used on the farm and not produced there must be hauled to the farm, and most farm crops must be hauled away to the railroad stations or local markets. In the case of the horticulturist or truck farmer, his products are of a perishable nature and must be placed upon the markets in as fresh, succulent and unbruised condition as possible, so that for him the question of profit and loss hinges on the accessiblity or inaccessibility of the market or shipping point.

The profit of all farm operations is represented by the difference between the cost of production plus the cost of transportation and the selling price. If at any time the cost of transportation shall wipe out this difference or margin of profit, production will of necessity cease. It therefore behooves every farming community to strive to keep its transportation at the lowest possible cost, for in so doing its farm profits will be increased and its wealth and prosperity thereby augmented.

The cost of transportation, thus becomes a vital one. Very little data is available from which to determine this cost, even approximately, although several efforts have been made to work out its solution. Manifestly the only way that it can be determined is to take a census of the traffic over the mileage upon which most of the

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hauling is done in any county or district, the length of haul and the tonnage hauled, and from this data deduce the average cost of moving one ton a distance of one mile. This has been done in a few counties. For instance, in San Joaquin County, California, such a census was taken and it was shown that about ninety per cent of the traffic passed over about twenty per cent of the roads. Other figures evolved have placed the average length of haul for the United States at 9.4 miles and the average cost at about 23 cents per ton mile, which, however, I believe to be rather high.

A very interesting investigation along this line was conducted in 1908 by the Cornell Experiment Station in Tompkins County, N. Y., and the results published as Bulletin No. 295. Tompkins County, in which Cornell University is located at Ithaca, is situated in the central portion of New York and is fairly representative of a large part of the farming area of the State. This investigation was carried out by methods which had been developed by the work of several previous years, and the results are based upon figures from 647 farms in the four townships immediately surrounding Ithaca, the area embraced being a little more than half of the whole country. One result shown was that the average weight of farm produce which is sold and transported from the farm is a little more than one-half (.5157) ton per acre of land under cultivation, which constitutes a fundamental fact upon which calculations may be based. Another fact ascertained was the average haul to market, which for 948 farms was found to be 3.16 miles.

If we apply the figures thus obtained to the area embraced by the Peninsula Horticultural Society we arrive at results which should help point the way for financing the improvement of your roads. In the territory which you represent there are, according to the 1910 census, 1,971,677 acres of improved farm lands, which, I take it, are producing crops annually. If from each of these one-half ton of produce is hauled away and marketed, your total haulage would amount to 985,838 tons, moved an average distance of 3.16 miles, excluding any tonnage that might be moved to the farms. If then we assume that 90 per cent of your tonnage passes over 20 per cent of your roads, and that by improving this 20 per cent of your roads you could effect a saving of five cents per ton mile in your transportation bill, your annual saving would be $155,762.

Why should not this saving be capitalized so as to help pay for improving the 20 per cent of roads? In your territory there are 9,742 miles of public roads, of which about five per cent have already been improved. Twenty per cent of this mileage would be 1,948 miles, and, if from this we deduct the five per cent already improved, we find remaining for improvement only 1,461 miles. To capitalize the annual saving shown above, we find that it will pay 5 per cent interest on $3,115,248, which would be $2,132 per mile on the remaining mile-

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age necessary to be improved in order to get the desired twenty per cent.

Soil, climatic and traffic conditions throughout the entire peninsula section are such that sand-clay roads will probably largely answer the requirements. This type of road can be constructed and maintained at a much smaller cost than macadam or other hard surface roads. It requires about one cubic yard of clay to surface one and one-half running yards of road twelve feet in width, or about 1,175 cubic yards to the mile. From three-fourths to one cubic yard will make a load for a team of two horses on a dry clay road. The cost of this type of road will vary with local conditions, but the average for the United States is about $750 per mile. As an indication of how this cost may vary, a sand-clay road built by the Office of Public Roads at Demopolis, Alabama, during last year, cost at the rate of $1,275 per mile, and another one built at Liberty, Mississippi, cost at the rate of $396 per mile. The saving shown would, therefore, finance a loan sufficient to build about 4,150 miles, and these roads after improvement could be largely maintained by the use of the split-log drag at a very small cost.

In addition to the saving which improved highways will effect in the item of transportation, they will also cause an increase in the value of farm lands. In every case where good roads are constructed through a community, the land values in that community have immediately advanced. Land owners sometimes object to the argument of an increase in the value of their lands, claiming that the improved roads will not increase the productive capacity of the land, while the enhanced value will increase the taxes. This, however, is not necessarily the case. The increase in farm values and the general prosperity which usually follows road improvements is so great that the tax rate is frequently lower afterwards than before the improvements were begun. This statement is substantiated by the experience of various counties and individual farmers.

To cite one instance near to your home, I refer you to Monmouth County, New Jersey. That county began the improvement of its roads in 1896, and affords a striking illustration of increased property values and reduced tax levy. In 1904 it had improved 12.99 per cent of its roads, and in 1909, 17.95 per cent. In 1904 the taxable valuation of the county was a little over sixty million dollars ($60,892,358), and the rate of tax levy was $0.801 on the hundred dollars. In 1911 the taxable value of this county had increased to ninety-six million dollars ($96,497,913) and the tax levy had decreased to $0.408 on the hundred dollars. While this is only one instance, yet it is illustrative of what has taken place in many other counties.

In addition to the financial advantages which result from improved roads, there are numerous social advantages which accrue. The tendency is to lay most stress on the financial benefits and to

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overlook the other benefits. While the money value of improved roads is immense, yet it is of no greater importance than the social advantages which follow. Of course, the latter are of an intangible nature and cannot be measured according to any monetary standard, but they are apparent in a more contented and intelligent citizenship.

A paramount question in the public mind today is better rural school facilities. The rural population is more willing to support better schools today than at any previous time, but they demand that the school system be so changed as to touch more clearly than ever before the vital phases of life. It is being realized that all educational activities or agencies must be more or less correlated, and, more than all else, that they must be made accessible to the children. In many counties where bad roads prevail, most of the schools are of the antiquated one-room variety. They are usually located along bad roads which, during the winter, when the schools are usually in session, become so nearly impassable as to make it difficult for the children to reach them. This condition causes irregular attendance and restricts the educational opportunities of the child. Not only this, but it often impedes the economic consolidation of these smaller schools into larger, stronger graded schools, with high-school courses, directed by a competent principal and corps of teachers.

On the other hand, in counties which have improved their roads, the schools are easily reached, the average attendance greater, the efficiency largely increased and economic consolidation made possible. Regular attendance at school means consistent and regular growth of both school and pupil, and consolidation of schools means a maximum of efficiency at a minimum of cost. It is also noteworthy that there is a marked tendency for the consolidated school to become the social and intellectual center of the community. Most modern rural school houses are so constructed as to serve the community as gathering places for various kinds of public meetings, and where vans are used to convey the children to school during the day they are frequently pressed into service at night to haul the farmers and their wives to institute work, lectures, or entertainments at the schoolhouse. The consolidated school, therefore, becomes a sort of community center to which all educational and social activities converge, and in order that it may properly perform that function all of the highways leading to it should be so improved as to render it readily accessible throughout the year.

It may be said that the schools and churches of a community are its greatest moral and educational forces. Next to them, however, stands the rural mail delivery, which places the people of the rural districts in daily touch with the cities and the business world. The beneficial effect of this service upon the happiness and cheerfulness of the rural population is immeasurable, and when we consider the fact that the rural carriers engaged in this service travel over more

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than a million miles of our public roads daily, it is apparent that nothing can contribute more to its efficiency and regularity and to the economy of its administration than the improvement of these roads. It is for this reason that the Post Office Department has imposed a regulation which provides for the discontinuance of rural routes where the roads are not kept in such condition as to be traveled by the carriers with ease and facility, and in many instances rural routes have been discontinued because of the impassable condition of the roads.

There is also an esthetic value which attaches to improved highways. It is a noticeable fact that wherever the roads have been improved there has been a decided improvement in the farms and farm buildings. In fact, the presence of improved roads seems frequently to stimulate latent self-respect into practical expression. It is not at all surprising that a section of well nigh impassable road before one's door should react unfavorably upon the entire family, or that the presence there of a well built, attractive highway, should engender a laudable feeling of public spirit and home pride.

For these few moments I have tried, in a very brief way, to point out a few of the more prominent economic advantages which flow from improved roads. By a proper appreciation and appraisal of the value of these benefits it readily appears that they more than compensate for the trouble and expense of the improvements, for while we can in no way claim them to be a panacea for all rural short-comings and deficiencies, yet they should give a great impetus to agricultural development and prove a powerful factor in removing many of the most formidable barriers now obstructing rural progress.

PUBLICITY

STEPHEN M. PASCHALL, Philadelphia.

Advertising is both an art and a science. But if your interests are worth while, it is to your interest to cause others to know about them. Delaware is worth while. Delaware fruit growing deserves to be advertised. We have heard in this meeting much about good roads, and good roads are worth while in a civilized community. You are building good roads on this Peninsula, over which you carry as fine fruit as grows anywhere in the world. You have all these. You have a region that is worth advertising in a businesslike way by the whole people as a mass. It is true that often the most enterprising member of the family, on this Peninsula as well as elsewhere in the east, has left his home and gone west. Still there are enough left who are doing things to make this Peninsula a most enterprising place.

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What you want to do now is to talk and to write systematically about what you have and what you are doing. Let the people of the far west, of the Pacific coast, of the Mississippi valley, of the north and the south, and your neighbors of the east,—let everybody know that you have a garden spot and that you are tilling that garden. A western community would go wild in advertising if it had one-tenth of the advantages that are possessed by any community on this Peninsula. It is not for me to suggest how you shall do this advertising, but you should follow modern methods, you should keep up with the procession, and draw attention to your advantages so that the brightest men of the country will be attracted to the unimproved portions of your garden.

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COMMITTEES

President Sanger appointed the following committees to report at the annual meeting in Easton, Maryland, January 13, 14, 15, 1914.

Apples—Walter B. Harris, F. M. Soper, Rev. Alfred Smith.

Peaches—Jacob H. Rose, Benjamin F. Rash, F. C. Bancroft.

Pears—E. W. Emory, Professor W. R. Ballard, Herbert Richardson.

Nut Culture—J. W. Kerr, Pennell Emerson, J. Frank Biggs.

Grapes—G. Frank Gootee, E. T. Hipwell, Professor Burill.

Small Fruits—Jerome A. Davis, O. A. Newton, Dr. F. P. Herr.

Market Gardening—Francis E. Matthews, Professor J. F. Monroe, E. C. Johnson.

Sweet Potatoes—E. F. LeCates, W. Irving Walker, J. W. Killen.

White Potatoes—E. H. Shallcross, J. F. Dukes, James Friedel.

Fungus Diseases—Professor T. F. Manns, Professor J. B. S. Norton.

Injurious Insects—Professor A. B. Gahan, S. H. Derby, Orlando Harrison.

New Fruits—W. F. Allen, Professor W. F. Massey, D. S. Collins.

Fertilizers—Dr. H. J. Patterson, Harry P. Skipper, P. L. Cannon.

Horticultural Education—Professor T. B. Symons, Professor C. A. McCue.

Floriculture—Mrs. W. Irving Walker, Mrs. F. C. Bancroft, Mrs. W. F. Allen.

Transportation—O. A. Newton, W. F. Allen, W. Irving Walker, S. H. Derby, Charles Barker.

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TRANSACTIONS

OF THE

Bulletin 3 No 3

PENINSULA HORTICULTURAL SOCIETY

1914

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TRANSACTIONS

OF THE

Twenty-seventh Annual Session

OF THE

Peninsula Horticultural Society

HELD IN

Easton, Maryland

January 13, 14, 15, 1914.

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OFFICERS FOR 1914

President,
EUGENE H. SHALLCROSS, McDonough, Delaware.

First Vice-President,
GEN. JOSEPH B. SETH, Easton, Maryland.

Secretary-Treasurer,
WESLEY WEBB, Dover, Delaware.

VICE-PRESIDENTS FOR THE SEVERAL COUNTIES

Delaware:

New Castle—James T. Shallcross, Jr., Middletown.
Kent—A. W. Slaymaker, Wyoming.
Sussex—George A. Hill, Bridgeville.

Maryland:

Cecil—Charles B. Warburton, Elkton.
Kent—Walter B. Harris, Worton.
Queen Anne—Harry P. Skipper, Chestertown.
Caroline—J. S. Lapham, Goldsboro.
Talbot—M. B. Nichols, Easton.
Dorchester—W. G. Dawson, Cambridge.
Wicomico—Fulton W. Allen, Salisbury.
Worcester—Orlando Harrison, Berlin.
Somerset—Frank E. Matthews, Pocomoke.

Virginia:

Accomac—A. J. McMath, Onley.
Northampton—W. L. Elzey, Exmore.

EXECUTIVE COMMITTEE

Eugene H. Shallcross, McDonough, Delaware.
F. M. Soper, Wyoming, Delaware.
Gen. Joseph B. Seth, Easton, Maryland.
W. Irving Walker, Chestertown, Maryland.
Col. A. W. Sisk, Preston, Maryland.

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Peninsula Horticultural Society

TWENTY-SEVENTH ANNUAL MEETING

The Twenty-seventh annual session of the Peninsula Horticultural Society was held at Music Hall, Easton, Maryland, January 13, 14, 15, 1914, President W. E. Sanger presiding.

The meeting was called to order at 2 o'clock and the Rev. William H. Litsinger, of Easton, Maryland, offered prayer.

The address of welcome was delivered by Gen. Joseph B. Seth, Easton, Maryland, and the response was made by Hon. William T. Warburton, Elkton, Maryland.

The President appointed the following committees: Auditing, Charles Barker, Benjamin F. Rash, Walter B. Harris; Nominations, W. Irving Walker, S. H. Derby, J. L. Soper; Resolutions, Professor C. A. McCue, Hon. W. T. Warburton, Eugene H. Shallcross.

The following officers were elected: President, Eugene H. Shallcross; First Vice-President, Gen. Joseph B. Seth; Secretary-Treasurer, Wesley Webb. Vice-Presidents for the counties: New Castle, James T. Shallcross, Jr.; Kent, A. W. Slaymaker; Sussex, George A. Hill; Cecil, Charles E. Warburton; Kent (Md.), Walter B. Harris; Queen Anne, Harry P. Skipper; Caroline, J. S. Lapham; Talbot, M. B. Nichols; Dorchester, W. G. Dawson; Wicomico, Fulton W. Allen; Worcester, Orlando Harrison; Somerset, Frank E. Matthews; Accomac, A. J. McMath; Northampton, W. L. Elzey. Executive Committee, Eugene H. Shallcross, F. M. Soper, Gen. Joseph B. Seth, W. Irving Walker, Col. A. W. Sisk.

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REPORT OF THE TREASURER.

WESLEY WEBB.

Receipts.

By balance January 15, 1913	$1,744.86	
Chamber of Commerce, Wilmington	500.00	
Delaware appropriation	500.00	
Maryland appropriation	500.00	
Delaware State Board of Agriculture	500.00	
Advertising in premium list	34.90	
Thomsen Chemical Co	10.00	
		$3,789.76

Expenditures.

H. E. Reed	$5.00
Clayton House	8.00
C. P. Close	10.84
H. E. Reed	1.25
George Morrison	8.46
F J. Benham	5.00
Richard Vincent, Jr	10.00
Henry C. Webb	20.00
E. R. Lake	6.25
Joseph Barton	3.60
C. G. Ritter	25.00
Horace Roberts	20.00
Sentinel Publishing Co	21.50
F. M. Soper & Son, premiums	599.00
E. H. Bancroft & Son, premiums	186.50
Sanger Bros., premiums	258.50
Walter B. Harris, premiums	36.50
Naudain & Son, premiums	12.00
J. W. Killen, premiums	21.50
W. P. Peach, premiums	1.50
W. B. Foote, premiums	1.00
W. H. Conard, premiums	6.00
R. P. Taylor, premiums	1.00
A. W. Armstrong, premiums	4.00

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Philip T. Pierson, premiums	1.50	
J. F. Brackin, premiums	11.00	
C. W. Fisher, premiums	3.00	
J. F. Dukes & Bro, premiums	4.00	
F. C. Snyder, premiums	.50	
F. E. Matthews, premiums	2.00	
G. W. Burris & Son, premiums	6.50	
Mrs. F. C. Snyder, premiums	10.00	
William C. Popp	24.00	
Wilmington Cold Storage	21.46	
James A. Hirons, postmaster	3.41	
P., W. & B. Railroad, freight	5.55	
James A. Hirons	16.77	
Newark Post, printing proceedings	418.41	
Prof. T. B. Symons	15.00	
E. I. Oswald	2.00	
Bastian Bros	14.47	
State Sentinel Printing Co	27.00	
Wesley Webb	126.27	
Torsch & Frantz Badge Co	21.06	
Balance January 14, 1914	1,783.46	
		$3,789.76

REPORT OF THE AUDITING COMMITTEE.

Your committee, appointed to audit the accounts of the Secretary-Treasurer of the Peninsula Horticultural Society, report they have examined the same and find them correct. Balance on hand last audit, $1,744.86; received during the year, $2,044.90, making a total of $3,789.76; disbursements, $2,006.30, leaving a balance in hand January 14, 1914, of $1,783.46.

CHARLES BARKER.
BENJ. F. RASH.
WALTER B. HARRIS.

REPORT OF JUDGE ON FRUITS.

CHESTER J. TYSON, Flora Dale, Pa.

For best general display of apples: First prize, $150, to F. M. Soper & Son, Magnolia, Delaware; second prize, $100, Sanger Brothers, Cordova, Maryland; third prize, $50, to E. H. Shallcross, McDonough, Delaware.

Best single box—First, $25, F. M. Soper & Son, Magnolia, Del.; second, $15, Sanger Brothers, Cordova, Md.; third, $10, Walter B. Harris, Worton, Md.

Best three boxes—First, $15, F. M. Soper & Son, Magnolia, Del.; second, $10, Sanger Brothers, Cordova, Md.; third, $5, E. H. Shallcross, McDonough, Del.

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Best five boxes—First, $25, Sanger Brothers, Cordova, Md.; second, $15, F. M. Soper & Son, Magnolia, Del.; third, $10, E. H. Shallcross, McDonough, Del.

Best ten boxes—First, $50, Sanger Brothers; second, $30, F. M. Soper & Son, Magnolia, Del.; third, $15, Walter B. Harris, Worton, Md.

Best single box of varieties—First, $5; second, $3; third, $2.

Ben Davis—First, F. M. Soper & Son, Magnolia, Del.; second, E. H. Shallcross, McDonough, Del.

Grimes—First, E. H. Shallcross, McDonough, Del.; second, F. M. Soper & Son, Magnolia, Del.; third, Sanger Brothers, Cordova, Md.

Jonathan—First, F. M. Soper & Son, Magnolia, Del.; second, E. H. Shallcross, McDonough, Del.

Lawver—First, Walter B. Harris, Worton, Md.

Limbertwig—Second, F. M. Soper & Son, Magnolia, Del.

Lankford—Second, Walter B. Harris, Worton, Md.; third, E. H. Shallcross, McDonough, Del.

Nero—First, F. M. Soper & Son, Magnolia, Del.; second, E. H. Shallcross, McDonough, Del.

Nickajack—First, F. M. Soper & Son, Magnolia, Del.

Paragon—First, F. M. Soper & Son, Magnolia, Del.; third, Walter B. Harris, Worton, Md.

Rome—First, F. M. Soper & Son, Magnolia, Del.; second, Sanger Brothers, Cordova, Md.

Stark—Second, F. M. Soper & Son, Magnolia, Del.; third, Walter B. Harris, Worton, Md.

Stayman—First, F. M. Soper & Son, Magnolia, Del.; second, Walter B. Harris, Worton, Md.

Winesap—First, F. M. Soper & Son, Magnolia, Del.; second, Sanger Brothers, Cordova, Md.; third, E. H. Shallcross, McDonough, Del.

York Imperial—First, F. M. Soper & Son, Magnolia, Del.; second, Sanger Brothers, Cordova, Md.; third, Walter B. Harris, Worton, Md.

Best three-barrel collection—First, $15, Sanger Brothers, Cordova, Md.; second, $10, E. H. Shallcross, McDonough, Del.

Best single barrel of varieties—First, $5; second, $3.

Ben Davis—First, Sanger Brothers, Cordova, Md.; second, E. H. Shallcross, McDonough, Del.

Grimes—First, Sanger Brothers, Cordova, Md.; second, E. H. Shallcross, McDonough, Del.

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Jonathan—Second, E. H. Shallcross, McDonough, Del.

Stayman—First, F. M. Soper & Son, Magnolia, Del.

Rome—First, Sanger Brothers, Cordova, Md.

Winesap—First, Sanger Brothers, Cordova, Md.

York Imperial—First, Walter B. Harris, Worton, Md.; second, Sanger Brothers, Cordova, Md.

Best single plate of apples—First $1.50; second, 75 cents.

Stayman's Winesap—First, F. M. Soper & Son, Magnolia, Del.; second, W. B. Harris, Worton, Md.

Ben Davis—First, Sanger Brothers, Cordova, Md.; second, Walter B. Harris, Worton, Md.

English Redstreak—Second, F. M. Soper & Son, Magnolia, Del.

Gano—Second, F. M. Soper & Son, Magnolia, Del.

Grimes—First, F. M. Soper & Son, Magnolia, Del.; second, Sanger Brothers, Cordova, Md.

Jonathan—First, F. M. Soper & Son, Magnolia, Del.; second, E. H. Shallcross, McDonough, Del.

Lawver—First, Walter B. Harris, Worton, Md.; second F. M. Soper, & Son, Magnolia, Del.

Lankford—First, Walter B. Harris, Worton, Md.; second, E. H. Shallcross, McDonough, Del.

Limbertwig—First, Walter B. Harris, Worton, Md.; second, F. M. Soper & Son, Magnolia, Del.

Nero—First, F. M. Soper & Son, Magnolia, Del.; second, E. H. Shallcross, McDonough, Del.

Nickajack—First, F. M. Soper & Son, Magnolia, Del.

Paragon—First, F. M. Soper & Son, Magnolia, Del.; second, Walter B. Harris, Worton, Md.

Rome—First, F. M. Soper & Son, Magnolia, Del.; second, Sanger Brothers, Cordova, Md.

Smith Cider—First, Walter B. Harris, Worton, Md.; second E. H. Shallcross, McDonough, Del.

Stayman—First, F. M. Soper & Son, Magnolia, Del.; second, Walter B. Harris, Worton, Md.

Stark—First, Walter B. Harris, Worton, Md.; second, F. M. Soper & Son, Magnolia, Del.

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Tewksbury—First, Gen. Joseph B. Seth, Easton, Md.

Winesap—First, E. H. Shallcross, McDonough, Del.; second, Sanger Brothers, Cordova, Md.

Yellow Transparent—First, F. M. Soper & Son, Magnolia, Del.

York Imperial—First, Sanger Brothers, Cordova, Md.; second, F. M. Soper & Son, Magnolia, Del.

Nuts.

Best collection of chestnuts—First, $5, J. S. Kelley, Preston, Md.; second, $3, J. W. Killen, Felton, Del.

Best collection of nuts—First, $5, J. W. Killen, Felton, Del.; second, $3, J. S. Kelley, Preston, Md.

REPORT OF THE JUDGE ON VEGETABLES.

GEORGE MORRISON, Baltimore, Md.

Referring briefly to the vegetable exhibit at Easton, I find a larger exhibit than at Wilmington in 1913. The quality is also better, especially potatoes, carrots, and turnips. I might call attention here to the lack of uniformity of many of the exhibits; also, the size and quality of other exhibits. Every individual exhibit, such as potatoes, carrots, beets, parsnips, etc., should be selected with more care, and should be of one variety, type, uniform, smooth, and devoid of blemishes of any kind, and at the proper stage of development for table use. Potatoes should be mature, while such crops as turnips, beets, carrots, etc., should be young and tender. I found at both Wilmington and Easton serious defects in this respect, especially in turnips and carrots, too old and large to be at their best for table use.

Quality, uniformity in type, and size are factors of great importance in the marketing of any vegetable crop, and without complying with these requirements one need not expect the best market prices. These annual exhibitions and meetings do much to demonstrate the defects in vegetable culture as well as in other branches of the horticultural industry, and drove home with considerable emphasis the necessity for better understanding in the cultivation, selection, and grading of the various products of the soil.

Best collection—First, $25, J. Howard Hirst, Cambridge, Md.; second $15, George T. Robinson, Easton, Md.; third, $10, J. W. Killen, Felton, Del.

Cabbage—For best three heads, first, $1.50; second, 75 cents.

Danish Baldhead—First, Delaware Railroad Demonstration Farm, Bacon, Del.

Drumhead—Second, J. W. Killen, Felton, Del.

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Flat Dutch—First, J. W. Killen, Felton, Del.; second, J. Howard Hirst, Cambridge, Md.

Potatoes—Best collection—First, $10, James T. Shallcross, Middletown, Del.; second, $5, F. J. Dukes & Brother, Girdletree, Md.

Best collection of barrels of white potatoes—First, $5, F. J. Dukes & Bro., Girdletree, Md.

Best ⅞ basket of varieties—First, $2; second, $1.

Mountain Rose—Second, Gen. Joseph B. Seth, Easton, Md.

Green Mountain—First, F. J. Dukes & Brother, Girdletree; second, T. F. Blake, Easton, Md.

Irish Cobbler—First, F. J. Dukes & Brother, Girdletree, Md.

McCormick—First, F. J. Dukes & Brother, Girdletree, Md.

Rehoboth—First, F. J. Dukes & Brother, Girdletree, Md.

State of Maine—First, F. C. Snyder, Newport, Del.

Sweet Potatoes—Best ⅞ basket of varieties—

Big Stem Jersey—First, $2, F. J. Dukes & Brother, Girdletree, Md.; second, $1, N. T. Nelson, Windy Hill, Md.

Best collection of slip seed sweet potatoes—$3, F. J. Dukes & Brother, Girdletree, Md.

Carrots—First, $1.50, J. Howard Hirst, Cambridge, Md.; second, 75 cents, J. W. Killen, Felton, Del.

Celery—First, $1.50, J. W. Killen, Felton, Del.

Kale—First, $1.50, J. Howard Hirst, Cambridge, Md.; second, 75 cents, J. W. Killen, Felton, Del.

Lettuce—Head, first, $1.50, J. Howard Hirst, Cambridge, Md.

Leaf, first, $1.50, J. Howard Hirst, Cambridge, Md.

Cos, first, $1.50, J. Howard Hirst, Cambridge, Md.

Parsnips—Second, 75 cents, J. W. Killen, Felton, Del.

Salsify—First, $1.50, Delaware Railroad Demonstration Farm, Bacon, Del.; second, $75 cents, J. W. Killen, Felton, Del.

Pumpkins—First, $1.50, Robert Symons, Easton, Md.; second, 75 cents, J. Howard Hirst, Cambridge, Md.

Parsley—Second, 75 cents, J. W. Killen, Felton, Del.

Spinach—First, $1.50, J. Howard Hirst, Cambridge, Md.; second, 75 cents, J. W. Killen, Felton, Del.

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Turnips—First, $1.50, J. Howard Hirst, Cambridge, Md.; second, 75 cents, J. W. Killen, Felton, Del.

Canned Goods—First, $10, Mrs. Mary V. Golt, Easton, Md.; second, $5, Mrs. F. C. Snyder, Newport, Del.; third, $2, Mrs. Theodore Ferguson, Blackbird, Del.

Special Prizes—4 tons Limoid offered by Charles Warner Co., Wilmington, Del., to Delaware Railroad Demonstration Farm, Bacon, Del., for display of vegetables and other farm products; $5 worth nursery stock offered by the Delaware Nurseries, Milford, Del., to H. Windfohr, Easton, Md., for display of vegetables; $5 worth nursery stock offered by the Delaware Nurseries, Milford, Del., to Fred Hirst, Cambridge, Md.; $3 worth nursery stock offered by Delaware Nurseries, Milford, Del., for collection of cabbage, to E. C. Attix, Kenton, Del.

Special prize for pickles, $2, to Mrs. George A. Phillips, Easton, Md.

The $10 prize contributed by Gen. Joseph B. Seth, of Easton, Md., for the best Martin house, was awarded to Henry Didier, Easton, Md. Other boys who exhibited houses are J. Kingsley Mercer, Ridgely, Md.; Brian Langsdale, Easton, Md.; John D. Gray, Mt. Pleasant, Del.; Merrill Culver, Salisbury, Md.; Ambrose Killen, Felton, Del. The committee recommended that each competitor be recognized and given $2.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Resolved, That the thanks of the Society be tendered to The Shannahan & Wrightson Hardware Company, of Easton, for their generosity in placing their display room at the disposal of this Society; and

Be it resolved, That the Society also express its thanks to Mr. M. M. Wright, who so kindly loaned plates for the exhibit.

Resolved, That the thanks of this Society be given to the pastor and trustees of the Calvary Methodist Protestant Church for the use of the lecture room of the church as a meeting place when the regular hall was too cold for comfort.

Resolved, That this Society express its appreciation of the untiring efforts of Mr. M. B. Nichols, Gen. J. B. Seth, and Mr. H. H. Langsdale in making the local arrangements for the meeting of the Society, and also that the thanks of the Society be tendered to the ladies of Easton who comprised the entertainment committee for the reception and banquet given the visiting members of the Society.

Resolved, That the thanks of the Society be given the people of Easton who so kindly opened their homes to entertain members of this Society.

Whereas there have been introduced into Congress several bills looking toward the control of stored food products; and whereas one such bill provides that food products may not be kept in cold storage for a period longer than ninety days, and that any food products stored for a period of ten days or

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over if taken from storage may not be again placed in cold storage; and whereas such restrictions and such legislation would work an injustice to the fruit interests of the entire country; and whereas such legislation would tend to limit the apple-consuming period of each year,

Be it resolved, That this Society express their disapproval of such legislation and that the officers of this Society be instructed to communicate with the U. S. Senators and Congressman from Maryland and Delaware and urge upon them the necessity of using their influence in defeating such proposed legislation.

Be it resolved, That this Society favors liberal appropriations from the Delaware and Maryland Legislatures for the State Agricultural Colleges in Delaware and Maryland for the purpose of promoting agricultural education; and be it further resolved that the Secretary of this Society be instructed to place this resolution before the members of their respective legislatures at their next meeting.

Be it resolved, That the Maryland and Delaware Legislatures be requested to increase their annual appropriation to the Peninsula Horticultural Society from $500 to $1,000, and that the members of this Society living in Maryland and Delaware be urged to bring this resolution to the attention of the present Legislature of Maryland.

Whereas God in His infinite wisdom has removed from our midst the first President of this Society, Mr. J. W. Kerr; and whereas in Mr. Kerr the Peninsula Horticultural Society has lost one of its most active workers, whose kind and loving presence at our meetings created an atmosphere of good-fellowship: therefore be it

Resolved, We hereby extend to the family of our late fellow-member our sincere sympathy; and further be it

Resolved, That a copy of this resolution be sent to the family and also be spread upon the minutes of the Society.

Signed,

C. A. McCUE, Chairman.
E. H. SHALLCROSS.
W. E. WARBURTON.

Upon motion, the matter of erecting a tablet to the memory of Mr. Kerr was referred to the Executive Committee.

Upon motion, Wilmington was selected as the place of the next meeting, the date to be fixed by the Executive Committee.

Upon motion of W. Irving Walker, the Secretary was instructed to include in the proceedings of this meeting a list of the dates, places, with name of presiding officer, of the annual meetings of the Society.

Lantern slide lectures were delivered by Prof. C. A. McCue on Cover Crops in the Peach Orchard; Dr. Cyril G. Hopkins on The Use of Fertilizers; and by Richard Vincent, Jr., on Floriculture.

Mr. W. H. Manss, General Manager of the Southern Settlement and Devel-

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opment Organization, made an address explaining the work of this association, whose sole purpose is to develop the agricultural and other resources of Maryland and other Southeastern States.

Governor Goldsborough wrote expressing regret that on account of the meeting of the Maryland Legislature he would not be able to be present.

Governor Charles R. Miller, of Delaware, sent a telegram extending his compliments and regards to the members of the Society and regretting that an important business matter prevented him from being present to address the Society.

Mr. Emmor Roberts, delegate from the New Jersey Horticultural Society, was introduced and expressed his gratification at being present at the meeting. He said that he came to bring greetings from New Jersey, and expressed the belief that the horticultural societies are doing much for their several States. With the growth of population in the cities we may expect prices for farm products to be maintained at their present level at least, and with improved methods of farming, profits are likely to be greater rather than less. Lands are advancing in price and the outlook for agriculture, and especially for horticulture, is good. Therefore he would strongly advise young men to take a course in the agricultural college and then return to the farm. The experiment stations are doing much to help the farmer, and the information that they freely offer should be utilized to the fuliest extent.

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ADDRESS OF WELCOME

GEN. JOSEPH B. SETH, Easton, Md.

Mr. President and Fellow-Members of the Peninsula Horticultural Society:

On behalf of the citizens of Easton and Talbot County I desire to return our sincere thanks for your kind consideration in selecting the town of Easton as the place for this, your 27th annual exhibition, and to extend to you our heartiest welcome, and also to express to you the hope that this annual exhibition may result in general satisfaction and great benefit to the members of the society. The keys of the town are yours and our hearts and homes are open to you.

It is not considered exactly the thing to speak in praise of one's self, but I feel constrained to say that in my humble judgment the Peninsula Horticultural Society is the most valuable organization to the people and the business interests of the Peninsula that exists within this territory. This territory is strictly an agricultural one, and horticulture has become the most valuable industry we have. The newspapers sometimes speak of the Peninsula as the "Garden of Eden," and truly the designation is hardly a misnomer. We have been peculiarly favored by Providence. Our climate is healthful and salubrious, free from extremes of heat and cold, well supplied with moisture, and free from diseases which affect other communities, and a soil reasonably fertile, easily cultivated, and which responds readily to proper treatment, in a situation where transportation is easy, cheap, and within the shortest distance of the great consuming centers.

This Peninsula is the market garden for the New England and Middle States, with their great population of consumers of food products. The municipality of New York is estimated to contain 8,000,000 of people, who produce no article of food, and have to be fed from the outside. Taking in Boston and the surrounding cities, Philadelphia, and the cities in Pennsylvania, there is practically one-fourth of the population of the United States (25,000,000 of people) who have to be fed from the results of the labor of other people. The location of this Peninsula, with the network of railroads running through and across it, puts every farmer within easy access for the conveniences of shipment, and all perishable produce can be carried through in a few hours, starting at the close of the day and reaching Baltimore, Philadelphia, and New York, the great distributing points for produce, in time for the early markets the next morning, and with little loss by deterioration from handling or lying over.

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A gentleman who was at the Canners' Convention at Chicago two or three years ago upon his return told me that his trip had convinced him that every acre of land on the Peninsula was worth at least $250. With this statement I agree and would go him something better on his valuation. The one thing needed to give value to our land and to make us a prosperous and wealthy people is "intelligent industry." Ignorance and idleness are twin sisters, whose condition is always poverty, and industry with ignorance leads a haphazard existence which can never lead to much success. For one hundred years after the settlement of this Peninsula the one product grown for market was tobacco, which was also used as currency. Later on this gave way to wheat, corn having at all times been grown as a necessary food for home consumption and the care and maintenance of our stock. Our country was a clean country, comparatively; no fungus diseases and insects to destroy our crops, and all that was required of us was to plant and at harvest time gather. Those days, however, have passed, and now we have reached the time when it requires intelligence to select the crops to grow to the best advantage and profit. A judicious selection of seed counts for profit. We are required to combat fungus diseases and insects innumerable, and fight them with intelligence and scientific appliances in order to save a share of them for our profit. The harvesting and marketing makes also a demand upon our intelligence, and it is one where we must apply intelligent industry before we can hope for any success whatever. Without this we will be sure to fall behind in the race.

The building of the Delaware Railroad, from Newcastle to what is now known as the town of Delmar, fifty years ago, started the work of opening up quick transportation for perishable products, and since that time the lateral lines of the railroad running through the Peninsula to both bays, and the extension of the Delaware road in 1883 to Cape Charles through the two counties of Virginia, has brought about an entire change in our farming industry, and we have gradually learned that to get the best results from our opportunities we must take advantage of our position with reference to the consuming masses, and provide those articles of food which, on account of our nearness to market and convenience of shipment, we can put in the consuming centers in the shortest time, with the least expense and the least deterioration from transportation, and can thus gain an advantage over other sections in this regard.

In order to get full benefits of our situation it is necessary that our people should be educated to the full advantage of our situation and also to the requirements and demands that are made upon them with reference to the care and cultivation of their crops. This can best be done by our coming together and exchanging practical ideas. You can't teach people altogether through literature. They want occular demonstration. One man in a neighborhood, who is progressive and up to date in his methods, furnishes in his work an object lesson to dozens around him who see his methods and can take advantage of his information, whereas they could scarcely ever be reached by literature. It is this sort of work that the Horticultural Society

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can do, and the coming together and exchanging ideas with each other and taking them home for practical demonstration is the greatest assistance that can be given to the agricultural interests of the Peninsula.

The soil of the Peninsula below the Choptank River is not adapted to grain or grass growing, but is adapted to small fruits and vegetables. Soil that fifty years ago in the lower counties of the Shore would not have brought $5 per acre will now bring $50. In this county lands have increased in the last twenty years more than fourfold in many instances. One farm located near this town thirty years ago sold for $10,000, ten years ago for $12,500; eighteen months ago it sold for $27,000, and within the last two months has brought $38,000. Another farm within two miles of the town and not on the water sold in 1842 for $6,000, in 1886 for $11,000; six years ago it sold for $15,000, and within the last year has sold for $31,000, with practically few improvements. I think, therefore, that we can safely say that within the next fifty years the land in this county will go to $300 per acre. In wheat growing it is hard for us to realize $6 per acre. This would be the interest on an investment of $100, but in growing small fruits and vegetables we can double this many times. During the past season I am told that farmers residing near the town of Salisbury realized from their cantaloupes as much as $300 per acre (this would be 6 per cent on $5,000), and strawberries grown in the neighborhood of Ridgely, Laurel, and Pittsville realized from $200 to $450 per acre.

Maryland, the statistics show, cans nearly one-half of the tomatoes canned in the country, and this Peninsula produces the great bulk of those. Tomatoes can be grown, with proper intelligence and industry, to yield $100 per acre. I knew a gentleman in the county a year ago to receive $2,800 from 25 acres of tomatoes. It is not a difficult task to get 5 tons, and perhaps this is the average yield, but that is where the same degree of industry and intelligence is not applied as there is where 10 tons are grown, and it is the intelligence that is to count, and when people learn how to do and what is necessary to be done they will be very apt to do it. With all these opportunities and examples before us I do not think that a greater opportunity for usefulness could be offered than that which is offered by the Peninsula Horticultural Society. The marketing becomes now an essential feature, and each community should learn what product their soil and climate will produce to the best advantage, and they should grow that product as a community, thus making a home market for it.

During the last summer Berlin was a market for peaches because the peaches were there; Pittsville, Laurel, Ridgely, and other towns were markets for strawberries because the strawberries were there; Onley was the market for white potatoes because the potatoes were there; Salisbury was the market for cantaloupes because the cantaloupes were there; Wyoming was the market for apples because the apples were there; and so the farmers in a particular community should come together in a friendly rivalry to grow a certain crop or crops, and to grow the best of these crops, and to market

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them in the best condition. This will make a market right at your door and will bring buyers to take your produce at the station and hand over your money, without the intervention of the middleman.

I congratulate you on your opportunities to do good. I congratulate you on the field in which you have to labor, and I feel assured that great good will be the result from your organization, not only to your members individually, but to the people of the community in which you reside.

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RESPONSE TO ADDRESS OF WELCOME

HON. WILLIAM T. WARBURTON, Elkton, Md.

The cultivation of the earth is the only trade which God ever commanded any man to exercise, and it seems to have been a part of the divine economy to surround it with attractions. Our natural organization is fitted for the country and not for the town. The human eye is so formed that it rests with pleasure upon green and blue and cannot, indeed, endure any other color for a long time without injury. Our sense of sight is never so delighted because never employed in a manner so congenial to the nature of its organ as when we look upward into the clear blue of the heaven or abroad upon the green earth.

When man was entirely blessed he was placed in a garden of comprehending grounds of vast extent and boundless magnificence, adorned with flowers and enriched with fruits.

Hill and dale, forest and fountain, shady walks and sunny slopes and verdant meadows, with four great rivers rolling through them, formed a landscape such as no eye has seen since the fall. It was here that heaven and all happy constellations shed their selectest influence upon the marriage of our first parents.

Imagination has never painted a scene of perfect happiness without similar surroundings. Scenes of Idyllian beauty form the principal feature in the heaven of every religion, whether true or false. The Elysian fields of Greek mythology and the Paradise of Mohammed are ready examples. The land which flowed with milk and honey was to the Jew a type of that better country to which he would go when his journey through the wilderness of life was closed, and many a Christian whose soul has recoiled at the dark river of death has had his courage revived by the assurance that

"Sweet fields beyond the swelling flood
Stand dressed in living green."

We do not know what those fields are, as they are beyond the power of human ken, and from that voyage there is no returning sail. What we have seen we can speak of with truthful accuracy, and I have no hesitation in asserting that what is known to our geography as the Maryland, Delaware and Virginia Peninsula is as fair a land as the sun sees in all his wheeling course. For diversity of products its soil is unequaled upon the face of the globe. Its climatic conditions are ideal. Its population constitute a God-fearing and law-abiding citizenship. Its daughters are the fairest and love-

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liest in all the earth. The magnificent coloring of our apples and peaches are but the reflected rays from the cheeks of our maidens. Upon this Peninsula is to be wrought out the greatest horticultural development that not only this country but the world has ever seen, and it affords me great pleasure to meet and mingle with the men engaged in this great work, which is yet in its infancy. The germs of the best patriotism are found in the love a man has for the home which he inhabits, for the soil he tills, for the trees that give him shade, and for the hills that stand in his pathway.

I wish to say to the young men who are in this audience that you should love this Peninsula as you love your mother. Do not be made to believe that gold apples grow on trees outside of this Peninsula. Do not be led to believe that temporal success and domestic happiness can be more readily obtained beyond her jurisdiction. You should resolve to remain on this Peninsula and assist in developing her great resources. Resolve to marry one of the beautiful girls of this section and establish here a home and by industry and economy maintain it and thus become a factor in the upbuilding of the prosperity of this section of the country. This Peninsula needs you and her undeveloped resources lie all about you awaiting only the skill and energy of her sons to touch them into new life and action.

I have sometimes heard young ladies remark that they would not marry a farmer, and when I have heard such a remark I form rather a poor estimate of the young lady who makes it. I trust there is no young lady on this Peninsula who prefers an aristocratic snob, a gouty, leprous, half-idiotic, sensual man to the sunbrowned American farmer, with bronze cheeks painted with pigments of the sky, whose nerves and muscles are as strong as Hercules, whose very sinew is hardened with the reaction of honest toil, whose blood is as pure as the waters of Castalia, who goes to his morning toil with feet winged as Mercury's, brushing the dew from the grass by the hedge rows on a June morning, breathing the ozone of God, and feeling himself a man.

I sincerely trust that from this gathering, and from this meeting of the Peninsula Horticultural Society, there may go forth an influence and an inspiration that will be felt throughout this Peninsula, arousing the people to a realization of the great possibilities within their reach; that in the near future these fertile fields will yield a golden harvest, and the fruits of our orchards will be known and sought after in every country in the civilized world.

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PRESIDENT'S ANNUAL ADDRESS

WILLIAM E. SANGER.

Fellow-Members of the Peninsula Horticultural Society, Ladies, and Gentlemen:

We have met for the twenty-seventh annual convention of the Peninsula Horticultural Society. This is the second time Easton has been favored with the coming of your worthy company.

When, four years ago, my brother and I drove through and around the snowdrifts to Centreville to attend, for our first time, the meeting of the Peninsula Horticultural Society, if it should have entered my mind that I should at any time be chosen your President I would have thought it the wildest of fancies. I appreciate the honor you have conferred upon me, even when I say it was as much unexpected to me as I feel it is unmerited.

Of the little I have learned in the fascinating study and practice of fruit growing I wish here to say that much of it has been gained by my attendance at horticultural meetings. To hear practical subjects discussed by practical men, to meet with such men in friendly chat and to bring our own products and place them on exhibition in competition with those of others and be beaten by the other fellow have been fruitful sources of information to me. I always want to know the why.

Now I want to speak briefly on a subject that I regard as the greatest problem before the Eastern fruit grower and trucker, and that is the problem of proper marketing and distribution of our products. I have the apple especially in mind, and all I say will have reference to the apple because I am more familiar with that, but it may apply to any other line of products under like conditions, because the principles involved are the same. Do you say this is no greater problem than that of producing good fruit? I think much more so. It is really no problem now to produce good fruit. It takes lots of hard study and work and we want to keep on studying and advancing along the lines, but we have found that we can produce good fruit if we apply the knowledge that has been gained by scientific and practical men, and you say that we have learned that we can sell it, too, everywhere, if we have good fruit. True. We don't need to concern ourselves about the market now. (We have no reason to complain this year.) But friends, with the enormous plantings of apples all over the country, I believe the time is coming when there will be an enormous amount of good fruit produced. Ordinarily we may be safe in saying that half the trees planted will never amount to anything (will go to insects and fungi), but at the present time many of these big plantations are

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in charge of practical, scientific fruit men, and will therefore make good. I have often asked, "Is there going to be an overproduction of apples?" I don't answer the question. This world is a big place. There are a big lot of people in it, and if they were all made acquainted with King Apple, knew how good a good one is, and if they would thus acquire the apple habit, I believe we would never supply the demand let our plantings be much greater. But if we continue to go on as in the past and follow the same avenues of distribution only, and make no greater effort to advertise the apple, to make known its good qualities, and further, if we do not remove some of the conditions which hinder consumption I am really afraid we will awake some day to a situation similar to that of 1896, when, with a crop of 69,000,000 barrels, the supply was greatly in excess of the demand from those markets through which it was distributed. I remember how, years ago, when peaches shipped from here to Baltimore, Philadelphia, and New York were not in many cases paying shipping expenses. At the same time friends from towns not many hundred miles away said they had been paying a dollar a basket for peaches. Let me quote from a no less noted authority than Mr. J. H. Hale, who, after some words of caution as to overplanting of peaches, said:

"There is no risk in cautioning anyone about overplanting apples. I have been growing fruit all my life, and have heard the question of overplanting discussed in every way, and I have watched the planting of all kinds of fruits, but never has anything taken place as at the present time the wild delirium of apple planting, and if any of you expect that, beginning five or six years from now, for the next ten or fifteen years after that, that you are going to sell apples at a profit, just write in the back part of your Bible, where you won't see it for many years to come, that Hale tells you you are going to be disappointed."

In referring to this it is not my purpose to sound a note of discouragement, not in the least. I do not fear overproduction, but I do fear underdistribution and underconsumption. I am not prepared to say just what can be done to ward off this danger, but it is my purpose to throw out suggestions as food for thought. Do you ask, "What is the use to concern ourselves about this now? It will be time enough to remedy evils when they arise." Let me tell you our cousins in the Northwest found out the folly of such policy to their sorrow in the season of 1912. While they had been organized as to producing fine fruit and putting it out in a uniform standard pack, yet they had given but little attention to the marketing end. Their fruit being of fine appearance and in prime condition, and a dependable, honest pack, it sold itself. They did not have to look for a market. Buyers were glad to come to them, but in 1912 they had a big crop and every other apple-producing section had a full crop, so when they proceeded to unload their entire crop of that year, and roll it in by the trainload onto the few large cities which had previously used the bulk of their production, these markets soon became blocked up and their fruit had to be disposed of at auction; consequently prices went to pieces.

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Then, when they looked to outside smaller cities, the dealers knew the Chicago prices and would pay no more.

The lesson taught by this experience is the necessity for organization. If there had been an organized selling force who would have permitted the fruit to have been put on the market only as utilized, then they might have disposed of their entire crop and fair prices would have been maintained. Cases are reported in which whole carloads of fancy Spitzenbergs sold at 90 cents per box, while the cost of picking, packing, and placing them in the car was 63 cents. Many of their growers lost heavily and were much discouraged.

We need more organized effort here in the East—first to carry on an advertising campaign. Why shouldn't the health-giving qualities of the apple be kept before the people just as well as those of Quaker Oats, Grape Nuts, etc.? Why shouldn't the people be taught the uses for which the different varieties are suited when each variety is in season? Should not an effort be made to reach the small out-of-the-way towns? In 1912 Seattle, with 250,000 population, consumed over 556,000 boxes, which is a little more than 2 bushels per capita. This is nothing large, is it? Anybody should use 2 bushels a year. Yet if the total 90,000,000 of the United States had used them as Seattle did 200,000,000 bushels would have been consumed in the United States alone.

The total 1912 crop was about 40,000,000 barrels, or 120,000,000 bushels. So with this big crop there would have been a shortage of 80,000,000 bushels. The consumption of apples, generally speaking, has increased but little during the last ten years, while the banana industry, through an efficient organized agency, has increased in the same time from less than $6,000,000 to nearly $15,000,000, almost 300 per cent. Only about four times as many apples as bananas are consumed. The banana is used only in the fresh state, while apples may be prepared in three hundred ways.

The International Apple Shippers' Association, with Mr. U. Grant Border as chairman of the advertising committee, is making an effort for publicity by furnishing a little book called "One Hundred and Ninety-seven Ways of Preparing the Apple." This is furnished to dealers to be given away to their consumers. These books are being given away at two booths in the exhibition hall.

Second, we need to use any means we can to bring to bear to overcome the dishonest pack and the putting of inferior fruit on the market, which still prevails, and is a greater bugbear than bugs and fungi.

Just before Christmas a dealer down the street told me he had bought from a car of New York apples, which, when he opened, he wouldn't have. He nailed them up and sent them back; wouldn't offer them to his trade. Then the other day another grocer around the corner here got a barrel of New York Baldwins from Baltimore of similar grade of stuff. True, it meant a sale for me in each case, but the selling of such stuff hurts the business. To see such fruit sitting around, with perhaps some partly decayed among it,

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drives the consumer away. The selling of a barrel of such fruit may hinder the sale of many barrels.

Thirdly, another evil to overcome is the exorbitant retail prices which prevail to a large extent. This hinders consumption very greatly. Dealers should be made to see that they are standing in their own light in doing so. A certain retail dealer in Baltimore admits that when he asked 100 per cent profit he sold one barrel a week and made a profit of $2.20. When he changed to a more reasonable profit of about one-third as much he sold ten barrels at a profit of $11.

Another thing that will help the consumption very greatly is to give the consumer apples of quality. I refer to varieties that have quality and that appeal to people's tastes. I wish to tell you what our good friend, Professor Watts, of Pennsylvania, said at Baltimore just after Mr. Hale made his remarks about overproduction, before referred to. He said: "I was glad to hear Mr. Hale say something about quality. I doubt whether (He has gone now, so I can say anything I want to), I doubt whether the time will come when we will have too many first-class Grimes' Golden, Stayman Winesap, and other apples of the higher quality. We do have too many Ben Davis apples right now. Let us cut the trees down. There is a fundamental principle right here that producers should recognize, namely, that the better the produce that we furnish the consumer the more he will eat, and we haven't recognized this principle."

I don't believe any man has a right to plant Ben Davis or any other apple of inferiour quality. He will not only do himself harm, but he will do the whole community an injustice, because when the consumer goes to the store and buys a dozen Ben Davis they will last for a month, while if he buys a dozen Stayman Winesaps they will be gone before night, and he will have to go back for more. In this effort to increase consumption we can have the happy assurance that we could bring to our fellowmen no greater material blessing than to induce them to eat more of this health-giving fruit.

There is one thing I wish to speak of yet. While I question the advisability of further extensive plantings of apples, and I think more attention should be given here to some other fruits, peaches especially, however, there is in many communities all over the country splendid opportunity for some one to plant, in a small way, and grow apples and other fruits for the local trade. I mean grow high-grade fruit. Let me illustrate: Twenty-five years ago father planted out here a small orchard of a succession of varieties. His idea was chiefly to grow a liberal supply for family use. People here at that time discouraged the planting of apples. They said this was no apple country; that apples grown here won't keep in winter. One man told us you could not give away good apples in Easton. Now Easton is buying them, and more freely this year than ever, I believe, even in the face of the present high market. And we expect to keep on and make her buy more and more apples. Also other small towns all around are calling for apples.

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I feel at this time I must express my personal appreciation of and to all those who have done so much to promote the success of this meeting and exhibit. And I want to make personal mention of the ladies, who so kindly responded to provide entertainment for our guests, and of Mr. M. B. Nichols, chairman, and Gen. Joseph B. Seth and Mr. H. H. Langsdale, to whose untiring efforts much credit is due, and of the Shannahan & Wrightson Hardware Company, who have shown us so great a courtesy in granting us the unrestricted use of their fine automobile display room, with heat and light. I certainly do appreciate this, and I am sure you all do.

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THE APPLE ORCHARD

By S. W. FLETCHER, Director Virginia Experiment Station.

I have not come here to advise any of you about how to handle your orchards, but merely to talk over with you some of the problems that I have met in handling my own orchard. This orchard is in the Shenandoah Valley, Virginia, at an altitude of 1,500 feet, and on a Hagerstown stony loam, a soil type very common in western Maryland. It had been badly neglected until a year or two before it came into my possession, four years ago. Ten per cent of the trees were gone, killed by woolly aphis, crown gall, San Jose scale, and other troubles. It had not been sprayed, and each year the leaves had dropped in midsummer from the effect of cedar rust, frog eye, and other foliage diseases. It had not been a profitable orchard. What I shall say this afternoon will cover some of the problems that have come to me from year to year in my endeavor to make it a profitable orchard, as it is now beginning ot be.

CULTIVATION.

The first problem was that of cultivation—whether to plow the orchard, which had been in sod most of the time for fifteen year, or whether to leave it in sod. I believe that a lack of an equable supply of moisture throughout the growing season does more to limit apple production than almost any other controlable factor. This orchard is on land that is gently sloping, it is easily plowed and worked, and it has seemed to me best to plow and harrow it every year, or every other year. We have in Virginia thousands of acres of profitable orchards on land so steep, or rocky, or so naturally fertile and moist that plowing and harrowing is entirely unnecessary and in some cases would be positively injurious. So the practice must fit the conditions; but where land is reasonably level, free from large rocks, and only moderately retentive of moisture, as mine is, unquestionably tillage is the better plan.

My experience has been that it pays to plow the apple orchard early, before the first of April, if possible. Later spring plowing is apt to give the trees a setback because it cuts off many of the annual feeding rootlets. Deep plowing is all right when the trees are young, but I believe in shallow tillage for the mature apple orchard. For my conditions, I find 5 inches deep enough; and the disk harrow and the one-horse plow are better than the two-horse plow.

For cover crops I have used crimson clover, hairy vetch, rye, cowpeas,

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soy beans, buckwheat, and red clover. Crimson clover is too uncertain about getting a stand on this clay soil and at this altitude (1,500 feet). It is all right, however, at lower altitudes and on lighter soils, such as you have here. I have found hairy vetch is much more satisfactory as a winter legume cover crop than crimson clover. It makes an unsatisfactory growth the first year because of lack of inoculation. After the first year it grows nicely. Soy beans are better than cowpeas with me. But old-fashioned red clover is best of all. I am now seeding a third of my bearing orchard to red clover in August and a third to soy beans in July, the areas alternating, as the red clover sod is left but one season, and is then plowed, harrowed until July 1, then seeded to soy beans.

PRUNING.

The next problem was that of pruning. The chief need in this orchard was to put into practice there the sentiment of the old Methodist hymn,, "Let a Little Sunshine In." Color plays a very important part in the salability of apples, especially since the passage of the Sulzer bill, which lays emphasis upon color. Anything that we can do to increase color increases profits. The color of apples, in my experience with this orchard, is not affected in the slightest degree, as some have believed, by applications of potash or any other fertilizer. It depends upon the amount of sunshine that the apples receive and upon the degree of maturity of the apples when picked. As the years go by I am taking out more and more wood, thinning out the top more, reducing the bearing surface, if necessary, for the sake of letting the sunshine in.

One special pruning problem in this orchard was the necessity for renewing the top. The trees were sixteen to eighteen years old, and many were quite stunted. There were only three or four main limbs, bent over and sunscalded on top. The problem was to make a new top. Four or five of the strongest suckers that developed on these limbs from the heavy pruning of the first year were left, and the new top formed on them. The result is that we now have, after five years, many two-story trees.

Summer pruning has been mentioned as desirable in the West to bring into bearing rapidly growing trees when they are four or five years old. We do not need this kind of pruning here except in rare cases. The only kind of summer pruning that is useful here is the cutting out of water sprouts. If these sprouts are cut out in the winter time, usually they will come again. Cut them out in the summer time and you are done with them.

FERTILIZING.

In the fertilizing of this orchard I have proceeded upon the theory that fertilizers are not necessary for an apple orchard on strong clay soil, under good care, especially as regards tillage and green manuring, except for weak or subnormal trees, as a stimulant to bring them back to normal vigor and productiveness. For the purpose of ascertaining which trees are subnormal

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I have adopted a system of tree-to-tree records, which I have found very profitable. I have a set of pocket size notebooks, in which a page is given to each tree in the orchard. Each year, about the last of August, when it becomes necessary to make a careful estimate as to the size of the coming crop, so as to know how many barrels to make, I go throught the orchard with a man who estimates the crop on each tree. As he calls out the number of barrels on each tree I mark it down and, at the same time, make a note on the condition of that tree. I have not found it necessary to paint or otherwise mark the trees. The first page is a record of tree 1, row 1; the next, of tree 2, row 1, and so on. The cost of keeping this tree-to-tree record of the yield and condition of each tree in this 40-acre orchard has not been over $10 per year. It can be done in two days, and it has given me a line on the behavior of every tree in the orchard. It will pay the fruit grower to deal with the individual tree, so as to make each one as profitable as possible, instead of considering the whole orchard the unit in management.

I have fertilized not by the orchard, but by the tree. As a result of the orchard clinic, the notebooks show which trees have not done well and need a fertilizer stimulant. The records show that some have produced less than a barrel per tree for the last four years, and some indicate, by short growth and yellow foliage, that they are not healthy. These are marked with a strip of cheese cloth, and in the spring, immediately after the blossoms fall, these trees are fertilized. Manure is the best orchard feltilizer on my land. I find that it pays better than commercial fertilizer, even when it costs $1 per big two-horse load, with a haul of 4 miles from livery stable to orchard. A good dressing of manure will give weak trees a stimulus that they will not forget for several years. It is especially valuable around young trees. But manure is hard to get, and as a substitute I have used a fertilizer composed of one part nitrate of soda and three parts of acid phosphate. I have not used potash, because most of our soils in Virginia are sufficiently rich in that plant food. Professor McCue tells me that some Delaware soils need potash; in these cases one part of muriate of potash can be added. The fertilizer is put on the weak trees just after the blossoms fall because that is the time when the trees need it most and will respond quickest. This has stimulated and rejuvenated a large number of the weak trees in the orchard. The application is from five to ten pounds per tree, according to its size and condition.

HOME PREPARATION OF LIME-SULPHUR.

One of the big problems, of course, is that of spraying. One corner of the orchard was badly infested with San Jose Scale, and getting worse every year. I have tried both the soluble oil spray and the lime-sulphur spray, and have come to the conclusion that for my conditions the lime-sulphur spray is preferable, chiefly because I can secure it much more cheaply. Until last year I bought commercial lime-sulphur solution, paying from $6.50 to $8 per barrel. Last year I decided that this was too much, and began making it myself. I secured from Griffith & Turner, in Baltimore, one of their little steam-feed

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cookers, costing $40, and boiled my lime-sulphur solution in two 50-gallon barrels, making 50 gallons at a time, each barrel being half full. The whole outfit, including boiler, steam pipe, steam hose, etc., cost me $60. I have been able to make my lime-sulphur solution for $3 per barrel on the equivalent of a 32-degree test, or less than half what I had been paying for it. This outfit will answer very well for a 40-acre orchard, or even larger.

CEDAR RUST.

The red cedar trees of adjacent roadsides, pastures, and woodlands spread the cedar rust to my apple trees. Four years ago I lost over $400 from cedar rust. My neighbors and I have since cut down the cedar trees within a radius of half a mile of our orchards, and we lost very little last year. However, in other parts of the Valley the loss was very great. It is estimated that in the Shenandoah Valley of Virginia there was a loss of a quarter of a million dollars last year from cedar rust. Spraying at just the right time helps some, but can not be depended upon for immunity, because the disease spreads just after rains, when spraying is difficult. The remedy is to cut down the cedar trees, and our growers are now organizing for this purpose and endeavoring to secure an amendment to the Crop Pest law of the State which will make it compulsory that cedar trees near apple orchards shall be cut down if they are a source of injury to orchards.

APHIS.

The root rot, caused in this case by a combination of woolly aphis and crown gall, has been especially injurious. This orchard was evidently planted with badly diseased nursery stock, and the aphis has developed on the roots year after year. Many of the trees were past saving, but most of them have been restored to vigor by manuring and applications of nitrate of soda. My experience agrees with the results of experiments, which show that direct application of tobacco stems, dust, or tobacco decoctions to the roots for woolly aphis rarely pay, at least here in the East, but anything that will stimulate the tree to outgrow the effects of the aphis, as manuring or fertilizer, is likely to pay.

The green aphis and rosy aphis, which attack the leaves of the tree, curling them, and attack the young fruits, making clusters of stunted apples, have done a good deal of damage. They have been controlled successfully by the use of tobacco spray, the "Black Leaf Forty Tobacco Extract." I have used it for three years and have had no trouble the last two years in controlling green and rosy aphis with it. The chief disadvantage is that it is very expensive. It costs $12.50 for a 10½-pound can, which is altogether too much. I suppose that is because there has been but one company making it; they have had a monopoly. I am glad to see now that there are a number of other firms going into the business of manufacturing nicotine extracts, and we may look for cheaper tobacco solutions. I have used it at the rate of 1 pint to 100 gallons of spray, it being put into the regular lime-sulphur-arsenate-of-lead

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spray for coddling moth and scab, applied just after the blossoms fall. Applied at that time it has almost completely eradicated the green and rosy aphis, and has done no damage whatever to the fruit nor lessened the effectiveness of the other chemicals in the spray.

UNPROFITABLE TREES.

I spoke of my tree-to-tree records, to discover which trees are paying and which are not. I wish to emphasize the value of this. It seems like a big job at first thought, but it is done at the time when it is necessary to go through the orchard, tree by tree, anyhow, to estimate the crop, so it is really very little trouble. These notes have discovered to me this fact—that 15 per cent of all the trees in this 40-acre orchard have not been paying for their keep. We hear much about "robber cows," and cow-testing associations are being organized to eliminate them from our dairy herds. Every fruit grower in this state is keeping some trees that do not pay for their keep. I think it is a practical problem to discover these and to eliminate them from the orchard.

Fifteen per cent of the trees in this old orchard have not produced an average of one barrel of apples a year for four years and, at my figures on cost of production and income, have not paid for the pruning, spraying, fertilizing, and tillage that has been given them. By keeping these individual tree records I have been able to give each of the weak trees the special fertilizer treatment which it needed. As a result the number of unprofitable trees has been reduced from 15 per cent to 3 per cent. Such records would not, of course, be as necessary in an orchard that has received good care from the beginning, as the trees will then be much more uniform.

VARIETIES.

I have 100 acres of young orchard coming on, and these present some problems. I have planted Grimes Golden, Stayman Winesap, York Imperial, Black Twig, Mother. My old orchard is York Imperial and Ben Davis. Ben Davis is the most profitable apple I have. I have never planted this variety and never will, but I am glad that I have some. The Ben Davis has its place, not in the special market for fancy fruit, but in the general market. Our apples, except the Yellow Newtown, go South, and the Ben Davis is able to stand the hot climate there better than any other variety. I have no patience with the man who puts Ben Davis on the Northern market with apples of high quality, but it has distinct value for shipping to trying climates. In my planting now, in every 100 trees I would plant 40 York Imperial, 30 Stayman Winesap, 10 Mammoth Black Twig (or Paragon, as it is often called), 10 Grimes Golden, and 10 Mother. The Mother apple you may not know. It is a red apple and especially fine for dessert use in November and December. It is larger than Grimes. The Delicious is a good bearer, but I have not planted it because with its very mild flavor,—almost sweet—it becomes insipid soon after coming out of cold storage. The great body of American people want a tart apple.

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Twenty per cent of my new planting are Grimes Golden and Mother, which brings up a problem that all of us have to face who have any quantity of apples to pick—that is, some means of lengthening the picking and marketing season. It takes a large force of men to handle the crop of 150 acres of apple orchard, and anything that we can do to extend the harvesting season and distribute the labor is desirable. Grimes Golden and Mother can be picked about ten days before the York comes on, and it enables us to get the help organized and the picking and packing systematized.

NURSERY STOCK.

My experience is that it pays to go to the nursery and examine trees before you buy them. No fruit grower who means business will place a large order with a nurseryman without first going to that nursery to inspect them for himself, and, if possible, see them shipped. I have done that with all my trees, and so far have discovered no infested trees or substitution of varieties. I have an orchard of 13 acres of York Imperial, planted five years ago, part of which were one-year-old trees and part two-year-old trees. You can not tell them apart at this time. The one-year-old trees have caught up with the two-year-old trees. I prefer one-year-old trees, provided I can get them large enough. I do not want a one-year-old tree that is only 3 feet high, because it can not be cut back enough to head it properly. It should be at least 5 feet high, preferably one year old from the bud, or a two-year-old tree from the root graft that was cut back at the end of the first year and made a 5-foot tree the next season.

DYNAMITING.

Dynamiting has been used in planting trees with satisfactory results in some cases and very unsatisfactory results in others. We have witnessed a lot of advertising for the benefit of "dynamite farming," and the practice has been magnified far beyond its real value. On soils that have a hard pan close to the surface dynamite will loosen up the land, but on all ordinary fruit soils that are good enough to put an orchard on you will get just as good results from digging as from dynamiting. In most cases it is simply a matter of economy. Can the hole be dug more cheaply with dynamite than with a spade? One caution about dynamiting for tree planting—always do it in the fall. If holes are dynamited in the spring for late spring planting and there should come a spring drought, the trees on the loose, open dynamited soil will dry out and die. I have seen many hundreds of trees in Virginia dead in dynamited holes.

CROPPING THE YOUNG ORCHARD.

For many years I have believed that the crops grown in the young orchards should be hoed crops—tomatoes, potatoes, corn, and other crops that you can work—and I still think that is the best practice if it is expedient. It is more expedient for me, however, to practice a regular farm rotation of corn, wheat

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and grass between the young trees. If this is done, a very important provision is to leave a cultivated strip of land around each row of trees from the very beginning, and every year the cultivated strip should be widened. The year the orchard is planted I would plant corn, running the corn rows not closer than 5 feet from the rows of trees. If the corn is planted closer than this, or right along in the row between trees, as some do, it robs the trees of moisture, shades them, and makes them spindling. The corn is followed with wheat or oats, but the grain is seeded not closer than 6 or 7 feet from the rows of trees. Each year the cultivated strip is widened, until the sixth year, when all crops are withdrawn from the orchard. On my land trees with this strip cultivation do pretty nearly as well as though the whole area was tilled. On some soils this might not be the case.

FROST PROTECTION.

Frost protection is another problem. My orchard is located on sloping land and I have had no trouble from frost, but there are some places where smudge pots can be used to advantage. I am satisfied, however, that we will not be able to get as good results from fire pots and smudges as they do in the West. Here it might be necessary to keep these smudges going several nights each week for two or three weeks. In the West the frost period usually is much shorter; they may have only two or three nights when there is no danger. If an orchard is located so that it has good air drainage, there is not much danger from frost; if the orchard does not have air drainage, it may be protected somewhat by smudges and fire pots, but I am sure that this method has not the application here that it has in the West.

HARVESTING.

In harvesting the crop my problem has been to get the right kind of labor. It is extremely exasperating to be dependent wholly upon local labor in a section where there are many apple orchards, and where the help can readily go to another orchard and so raise the price for picking from one dollar and a quarter a day to a dollar and seventy-five cents a day. This year I undertook to solve that problem by getting men from elsewhere and establishing a camp on the farm. This worked out very well indeed. I am satisfied that when a fruit grower has a large amount of fruit to harvest he must make himself independent of local help in this way.

SIZING MACHINE.

The Sulzer bill is placing a premium upon apples that are sized uniformly as well as upon apples that are of good color. There are in operation in Virginia this year, I should suppose twenty or twenty-five sizing machines, which grade apples to a quarter of an inch difference in size. So far as I have observed, they have been very satisfactory, and I look forward, in the management of my own orchard, to the installation of a sizing machine which will separate the apples into four sizes—2¼ inch, 2¾ inch, and 3 inch, and up—

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each size being packed by itself. We will have to get away from the old method of packing "2¼ inch up" or "2½ inch up." Sizing the apples makes a much more attractive pack, and the fruit sells better. The sizing machines have not yet been perfected. Some of them are rather crude, but there are some which handle the fruit without bruising, and which enable you to put up from 150 to 300 barrels a day. I am convinced that the apple-sizing machine has come to stay.

MARKETING.

I have sold my crop upon the tree to buyers, I have consigned it to commission men, and I have sold f. o. b., and my experience has been that whenever you can get an f. o. b. sale at a fair price, even at a price a little bit lower than you believe you could get on consignment or on storage, take the f. o. b. sale every time. The sooner the grower can make f. o. b. sales every year the better off he will be.

Question—About how high do you cut your trees off when you plant them?

Dr. Fletcher—About knee high.

Question—Does it hurt the trees to bear early?

Dr. Fletcher—I am not anxious to have them bear before they are six or seven years old.

Professor McCue—Do you plant Jonathan?

Dr. Fletcher—The Jonathan is an excellent apple, but is so subject to the "Jonathan spot" that I do not plant it.

Mr. Anthony—How far from the roots of the tree should manure be spread?

Dr. Fletcher—Not too close to the trunk. The feeding roots are not very close to the tree. Spread it under the outer branches.

Question—In using homemade lime-sulphur solution is it necessary to apply it hot, or immediately after it is made?

Dr. Fletcher—No. I use 50 pounds of lime to 100 pounds of sulphur, which make a solution testing 27 or 28 Beaume, diluting it for spraying according to the test. I have never had any difficulty in making and applying it. If home making is inexpedient, it is all right to use the commercial form. I keep it in open barrels, but put a skim of oil on top and it does not crystallize.

Question—Do you have the blight?

Dr. Fletcher—We have more or less twig blight, or fire blight, which is common to the apple and the pear. In the Grimes Golden it takes the form of collar blight and this can be handled only by top working. The York Imperial is subject to twig blight and the only way to handle it is to keep the trees growing slowly. If the young trees grow vigorously, they are sure to blight badly. The Kieffer pear is a menace to a nearby apple orchard, as it is a means of spreading the blight. Bees carry the blight germs from the Kieffer to the apple blossom. The York Imperial blights more seriously than any other variety we have.

Question—Is there any proof that we need to mix varieties in planting?

Dr. Fletcher—Experience has shown that of mixed varieties orchards are

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more productive than those not mixed, and there have been careful experiments upon the subject. However, there is not so much in cross-polination as was at one time supposed. Not all varieties are benefited by cross-polination; and the same variety may be self-sterile in one place and self-fertile in another.

Mr. John Buchanan—In mixing varieties how many rows of each kind would you put in a block?

Dr. Fletcher—I would plant four or five rows of a kind together, for a greater convenience in harvesting the fruit and spraying.

Mr. Brinkloe—Would you advise digging out a Kieffer pear orchard if it were near an apple orchard?

Dr. Fletcher—That would depend upon circumstances. If the Keiffer orchard was profitable, it might not be worth while.

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REPORT ON APPLES

WALTER B. HARRIS, Worton, Md.

The apple has been so thoroughly discussed by everybody the last yew years, and, as the public generally is so well informed, I am afraid I can give you no new information.

The apple crop in the United States as a whole has been short this last year, probably not more than 50 per cent of a normal crop, while for the Peninsula not more than 25 per cent of a normal crop, the result of late frosts and aphis.

The bloom was heavy and the fruit exceptionally free from fungus and insect injury other than aphis, which cut the crop left by the frosts about in half.

The average price of fancy early summer fruit and fall apples was nearly double that of last year, while winter apples only brought a small increase in price over last year.

While the price of apples is higher than it was a few years ago, the cost of production has also advanced even faster. The capital necessary in apple production has increased by leaps and bounds the last few years. The power sprayers, heavy teams, and a system of water supply have long since become a recognized necessity, and, with the trade demanding a pack of uniform fruit, the apple sizer is the only solution. At the recent meeting of the American Pomological Society in Washington the use of the apple grader was discussed to some extent and every grower present who was using a modern grading machine spoke of it as satisfactory and indispensable.

On any fruit farm there is two or three times as much team work in the spring as at any other time of the year, and we board these extra teams the larger part of the year just to meet this rush for three or four months. With low-headed trees and heavy implements it has become a problem to work around the trees without injury to the tree and the fruit. To overcome this difficulty the low down orchard tractors will soon be a part of all up-to-date orchard equipment. Then the fruit grower who caters to home trade has already found the auto truck a necessity.

These improvements all call for more intelligent and expensive labor.

Rev. Alfred Smith, a member of the committee on apples, writes me that as a result of frosts Mr. Bancroft had only 30 barrels for storage, while his previous crop was about 4,000 barrels. Mr. Smith has asked me to impress upon the growers the fact that lime and sulphur will not take the place of Bordeaux as a fungicide. He also spoke of the crops being injured by aphis.

I want to say in conclusion that I believe the box pack is the coming thing for us, and the sooner we learn the art of packing in boxes economically the better for us.

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MARKETING APPLES

CHESTER J. TYSON, Floradale, Pa.

We have been studying the proper methods of growing good fruit, and, of course, too much weight can not be placed on the importance of producing only the very best of everything, be it fruit, vegetables, or dairy products. To be successful, a salesman must have confidence in his wares, but he can not have this confidence if he knows that the articles he is selling are not up to grade.

Assuming that the question of production has been thoroughly canvassed, let me tell you that the failure to secure maximum returns for produce sold is a problem just as important as any we have to face, and, more often than in the matter of production, the settling of this question means profit or loss for a season's business.

Already, too long, we have taken what came to us as return for our hard year's work, sometimes complaining against fate and dishonest commission men, but never thinking to look to ourselves and our methods for the real cause of our failures.

I suppose this paper is supposed to turn to the handling of apples, but there are a few principles that apply to the marketing of any kind of produce and it is worth while to study them. Here are five rules. Follow all of them faithfully and you can hardly fail, assuming merit in your goods. Neglect any one and that may be the very opening through which losses will come:

1st. Study the markets, the prices, the demand, and the amount of supplies.

2d. Form a few good connections and stick to them. Do not be forever changing round.

3d. Establish standards of goods and of grading and packing and maintain them year after year.

4th. Be absolutely honest in all your dealings, from principle, not from policy.

5th. Do not hide your light under a bushel. Let every package that goes out bear your brand, and thus advertise your business.

STUDY THE MARKETS.

If you have much fruit to sell, it is important to know the markets to which it will go. Study their requirements and ship your produce accordingly. Most of you know from hearsay, if not from experience, that white eggs sell better in New York and brown ones in Philadelphia. It is just as true that York Imperial apples sell better in New York than Baldwins, but the reverse is true in Philadelphia and Pittsburgh. Grimes Golden and Smokehouse do

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not sell well in New York, but are in demand in Philadelphia, Baltimore, and Washington, D. C. Greenings do not sell at their best south of Mason and Dixon's line. You see what I mean. Study the markets. Keep track of prices, so that you may know what your fruit is worth and can talk intelligently to prospective buyers. Take a good trade paper or two. Ask the dealers to send you quotations. Do not take the best quotation you can find; average the lot. Visit the markets and compare prices actually paid with prices quoted. You will find a great mass of fruit selling below quotations, while here and there you will see an unusually fine lot, well graded and neatly packed, and probably bearing the grower's brand, selling at a considerable premium. Are you contributing to the great mass or to these occasional fine lots? Here is food for thought.

GET ACQUAINTED WITH YOUR TRADE.

Pick a very few good dealers and stick to them until you know them and they know you and your fruit. They can then offer your fruit with confidence to their best trade, and draw a premium for it.

ESTABLISH STANDARDS AND STICK TO THEM.

Do not put your fruit up one way one day and a different way the next, and keep your trade turning somersaults to keep track of the changes. The result will be that the trade will not bother to keep track, but will buy from someone who has established quality and grades.

LET YOUR LIGHT SHINE.

There can be no virtue in overmodesty. Let the world know what you are prepared to do for its comfort. Some well-organized advertising campaigns for the selling of fruit have been carried on, and have worked very well. Let every package of your fruit bear your name and address, and continually proclaim your business and the quality of your wares.

These are the principles, and, as I have said, they apply to whatever line of produce you wish to sell.

Now, in the marketing of apples we had better start with the harvesting of the fruit, otherwise we can not be sure of the condition in which it will reach the market.

In the first place, we shall assume that the fruit has been well grown; that the trees have been pruned, so that each limb and branch has room to bear its load of fruit without crowding or seriously shading any other loaded branch, the centers open to admit sunlight and a free passage of air; that the tree and fruit have been carefully and thoroughly sprayed for scale, if that pest is present; for codling moth, which is always present, and for the many fungous troubles of fruit and foliage; that the trees have been well fed with a ration balanced to meet their needs—a matter which only experiment in your own orchard will decide; that the question of moisture has

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been carefully seen to in the orchard, and that the fruit has been thinned when trees have set an overload. This is a practice which is being followed in the East more and more, and those who have done systematic thinning have found that it pays very well. Thinning not only improves the size and color, but removes a working place for insects and fungi, which operate between close hanging fruits and are much easier to control when no two apples hang together.

Shortly before starting to pick, all dropped fruit should be gathered from the ground and removed, partly to save it from decay and trampling by the pickers, and partly that the later falling and more valuable fruit shall not be mixed with it. If there is a canning house at hand, these early dropped apples can be sold, but if there is no market for them it is still better to remove them from the orchard.

Do not pick the apples too early. To my knowledge, thousands of barrels of apples are each year hurried from the trees and into market in a green and immature condition, which interferes with selling at full prices, and even affects the keeping quality of the fruit. Apples should hang on the trees until they have attained nearly the full normal color for the variety, and until they can be picked without pulling out stems or breaking off fruit spurs. Good, full color adds greatly to the market value of the apple. This is not entirely a matter of looks, either, for the consumer has learned that the matured apple has a greater amount of sugar, consequently a better flavor, than a green one. Of course, overmaturity must be avoided, but winter varieties seldom hang long enough to be overripe.

Apples that are mature and well colored are found to scald in storage much less readily than immature fruit, especially with red varieties. In this connection many growers overlook the fact that apples grow wonderfully in the last ten days before full maturity, adding bushels every day that they hang, much more than balancing the small loss that may occur from dropping, and paying largely for the occasional loss from winter storms.

Of course, the question of maturity is largely a question of varieties and you must know the characteristics of the fruit with which you are working. For instance, Grimes Golden and Greening must be picked in a much greener condition than most other kinds if they are to keep well in cold storage. Fortunately they do not depend upon a red skin for their sale. Staymans are often picked too green. When allowed to hang they become red and very attractive.

To be sure, it is not necessary to wait for every apple on the tree to mature and color. It is very good practice to start picking as soon as the apples on the top and outside branches are ready, leaving all immature fruit for a later picking. When I make this statement I am accustomed to have someone say that it is too much trouble, and that it will cost too much. For the man who considers anything too much trouble if it will improve his fruit, I have no argument. In the question of cost I am absolutely convinced, by experience and observation, that if the expense of picking were increased five-fold—which is ridiculous—it would still pay to make two or more pickings

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when the trees are heavily loaded. The advantage increases when the size of the crop makes it seem important to get the picking started early in the fall.

Whatever our market, or however we plan to ship our fruit, we should have in mind its safe and satisfactory arrival in the hands of the consumer, not merely its passage from our hands in return for a sum of money, for if we are in the fruit business to stay, either as grower or dealer, there is no other kind of advertisement that will go so far or carry so much weight as well-graded and well-packed fruit, plainly branded with the name and address of the packer.

Then let us see that the fruit is handled carefully. It is not always possible for us to control this matter absolutely, but I have learned from experience that the difficulty increases as the size of your crop grows, but it should be watched at every turn.

For many years we have used half-bushel, drop-handle baskets, each provided with a light iron hook to hang from a ladder step or limb, feeling that the apples would bruise much less than if picked into bags. There are two reasons for this: First, in the basket the apples lie where they fall, while in a bag they are constantly moving over each other with every motion of the picker's body, resulting in many slight bruises not noticeable at once in many varieties, perhaps never in Ben Davis; but in most kinds detracting greatly from the appearance of the fruit after being stored a little while. Then, nearly always, a few apples in each bag are bruised between the packer's body and the ladder steps or limbs of the tree, to such an extent that they must be discarded at once.

Now here comes an instance of the trouble I have already cited. Our 1913 crop was larger than any previous one and I began looking round for shorter cuts and cheaper methods. The question of bags or baskets has long been a subject of discussion with some of our neighboring growers, most of them careful men. They were using picking bags with apparently good results and showed me that they made better time and saved money. I fell, for a trial, at least, and our men started picking into bags. We watched the picking tables carefully and there was no evidence of serious bruising, at least no more than we were accustomed to, so we kept on using the bags.

Late in the seson, when the apples were ripening on the trees, I noticed a little more bruising, but I thought it was only a little relaxing of care, and, after cautioning the pickers, we went ahead with the bags. You will bear in mind that our apples were coming right from the tree to the packing house in smooth or lined crates on spring wagons, and, in most cases, were in the barrels in a few hours after picking.

The apples were shipped to New York and were put into cold storage there. In December we began selling, and very soon I received a hurry call to New York. The apples were showing a little bruising all through barrels; not much, but such as the commission man, who was selling our crop for the ninth season, had never seen in our fruit before. I spent a day in the storage house opening barrel after barrel, and I found that the first two weeks' barreling,

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while the apples were very hard, showed very little bruising. After that the trouble increased and here and there were little marks that had not shown when the apple was fresh, but had evidently come from rubbing together in the bag or from pressure against the ladder. The only kind of experience which is worth anything is that which has cost something.

In picking apples, where trees are not too high, I like a stepladder. A convenient height is 8 feet or 10 feet, and the ladder should be made with but three legs, so as to stand solidly on uneven ground. For high trees I use a ladder, the side rails of which come together to a point at the top.

The ladder can be pushed up between branches without knocking off fruit, and requires but one point of support at the upper end. The picking should begin on the lowest limbs and proceed upward. This saves many apples from being knocked to the ground by the pickers.

For barrel picking, the fruit is usually taken directly from the tree to a packing or sorting table, and is at once placed in the barrel. Some large growers are adopting a central packing-house plan, and I must may I like it very much. The apples are poured carefully into bushel crates. If the crates are not perfectly smooth on the inside, they should be lined with some material, to prevent bruising. Do not fill the crates quite full, so that they may be stacked up if desired. Wagons with springs are used for hauling to the packing house. I have proven to my own satisfaction that if the packing house is properly located and conveniently arranged, apples may be handled in this way cheaper and better than in the old way.

Never, except under the most extreme necessity, pour into piles on the ground. This will mean unnecessary bruising, a good deal of decay, and a lot more work every time.

The sorting table may be made in several ways. For some years I have used a frame 6 feet long by 3 feet wide and covered with burlap, canvas, old carpet, or any strong material. The table is supported by two trestles and stands as nearly level as possible. Each apple must be picked from the table by hand. The apples are placed by hand in round, half-bushel, drop-handle baskets. This basket can be lowered to the bottom of the barrel and then turned over by hand.

If the apples are to go into baskets or hampers, this is much the best table, for they can be placed directly in the shipping package by hand. Most persons are familiar with the ordinary running or sloping table, on which the apples are sorted as they roll from one end to the other, and from the lower end of which they are run into the barrel over a canvas apron. Many more of these tables are used than any other style; in fact, they are nearly universal in New York, Virginia, and West Virginia, and yet I do not like them very well, for the reason that the apples have rather rough handling and too many defects escape the sorters as the apples go by. I tried a table this year that was a compromise between these two styles. It was a sloping table 3 feet wide and 7 feet long with sloping sides, the sides and bottom thoroughly padded with double-thick cotton batting, and covered with bedticking. Across the middle

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of the table was a padded dividing board and every apple had to be taken up by hand and sorted across this division. They were then run on a piece of canvas and lowered into the barrel. With a few modifications I believe this table can be made to work very well. I find some men are inclined to roll the apples toward the barrel instead of laying them down carefully, and this must be guarded against.

At this point we must consider the package. Large quantities of western apples have been coming to our markets in boxes holding about a bushel. In most of these boxed shipments each apple is carefully wrapped and placed in the box by hand. Other shippers do not wrap; and still others lay a face only and pour in the balance of the apples. Some eastern growers have tried box packing in the past few years and are finding it decidedly profitable. I strongly recommend that more of our growers look into this method and try it, at least in a small way. Especially in packing for sale direct to consumers, boxes are found to work very well.

I must acknowledge that I do not share the opinion of some public speakers and many writers, that the time is fast coming when the box will entirely replace the barrel, as a package for apples. Indeed, I question whether the proportion of boxes to barrels will ever become much greater than in the present season, unless the sale of apples direct from grower to consumer should greatly increase.

Owing to the greater cost of box packing, this method is not profitable except in case of the best grades of fruit. Not all apples are good enough for box packing, and must be handled in some other way. Moreover, box packing is slower, and, in the rush of handling a large crop, it is not always practical, on account of time. Certain trade demands apples in barrels, even the best grades. Especially is this true of the southern trade, which is now taking a great many of our apples. This extra cost of boxes will always limit their use in selling to persons of moderate means, the largest users of apples today.

The box has its place with the consumer who wishes to buy only about one bushel of apples at a time, either through regular trade channels or direct from the grower. This trade will undoubtedly grow, but probably not out of proportion to the regular trade in barreled apples, which must grow enormously in the next few years if the many, many young orchards are to pay. Many realers who formerly bought boxed apples, because of the uncertainty of barreled fruit, are learning that there are growers of apples whose brands can be relied upon, and are now buying eastern grown apples in barrels. They can get an equal value at a lower price.

Do not understand me to say that I favor packing poor apples in barrels, for I most emphatically do not. Poor stuff, barreled and put regularly on the market, in competition with good apples, has a demoralizing effect on the whole market. Certain sections have gained such a reputation for barreling poor fruit that many years of fair dealing will be required to set them right with buyers of apples.

It is much better to sell these low grades locally, if possible, selling

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them to the cannery, fruit evaporator, or cider mill. If none of these give a satisfactory outlet, load the second grade stuff in bulk cars and ship in that way. In recent years the market for bulk apples has come to be a regular thing, and much of the cheap grade in the cities is supplied in that way, without adding the cost of barrel and labor packing.

If two or more varieties of apples are to be shipped loose in the same car, it is very important that they be divided by a wooden partition, especially if apples of varying color and ripeness are to be shipped together.

The ideal solution of this poor grade problem is, of course, to grow no low-grade fruit, and we have not secured the best that our business affords until we have closely approached this ideal. Lack of thoroughness in the things we already know is the reason why most of us fall short in this respect.

However you ship your apples, make sure that you have a full supply of clean, new, strong packages, well ahead of time. Use good barrels, of full standard size, head 17½ inches, outside bilge circumference 64 inches, length of staves 23½ inches. This is the U. S. standard apple barrel and contains 7,056 cubic inches.

If possible, get barrels made from well-dried staves, by expert coopers. Green staves will dry out after filling and leave the barrels loose, while poorly made barrels will result in much vexatious delay at a time when every moment must be made to count. The importance of a neat, substantial package is often overlooked. Avoid barrels made with sawed staves, which gather dirt from the time they leave the cooper, and often arrive at the market in a dingy condition. Insist also upon cut hoops of good quality, and upon clean, white heading, preferably some rather hard wood, but avoid oak or chestnut heads.

See that the croze, or groove, is cut to a good depth, and yet that the ends of the staves are not cut off. Chestnut staves make a good, substantial barrel, and are my preference. Elm and gum are substantial and look well; but beware of willow, cottonwood, or any other similar soft material for staves. I speak strongly on this point, having had some costly experience. Two or three loose barrels in a car cut down profits.

The barrel should be stood on a solid plank about a foot wide and two inches thick. As each basket of apples is emptied, the barrel should be well jarred down on the plank. When the barrel is full, the top should be leveled off and a ring of apples laid around the edge of the barrel. If the apples have been thoroughly jarred down throughout filling, it will not be necessary for the barrel to be filled much above the level of the staves. A false head, well padded, will help a good deal in leveling and settling down the apples.

For box packing, the apples will, of course, be brought to a packing house, as before described. Instead of pouring on a table to sort, the apples should be sorted direct from the crates into other crates, or directly on the packing table. This sorting consists of taking out all defective fruit and grading the perfect apples into about four sizes, as follows: (One) apples running larger than 80 to the box; (two) apples that will pack 80, 88, or 96; (three) apples that run 104, 112, and 120, and, if desired, a fourth size running

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125 and smaller. The packer further divides the sizes as he works. The actual process of packing you can best learn by seeing it demonstrated and trying it yourselves.

The standard Oregon box measures 10⅛ by 11⅝ by 18 inches inside measure. I like white pine or spruce for these boxes, made with solid ends three-fourths of an inch thick and with with two-piece tops and bottoms. If the sides are made with two pieces, they should be tightly jointed.

Now we have come to the actual selling of the fruit. You have not forgotten the rule to get acquainted with a good buyer. Spend some time, and money, if necessary, visiting these men and studying their selling methods and the class of trade they serve.

When you have found your man, stick to him. You may sell direct for cash; you may allow him to sell on commission, or you may make any other arrangement you may choose, but stick to your man, and if you do your part you will find him able to do better and better for you each year.

Perhaps you cater to a retail store trade. This is very desirable business if you are prepared to handle it. To work out best you must have storage facilities so as to keep the retailer supplied through a long season and in quantities to suit your trade. A great many stores with a good apple trade are looking for just such an arrangement. Get these men to visit your farm from time to time. Let them see the fruit growing. Show them how you grade and pack. Give them honest goods and you can tie them to you against any reasonable competition.

I have long been interested in a third method of selling, direct from the grower to the consumer. I am sure it is worth a careful study. The present cost of distribution is too high, and this may be one way to reduce it. I find there are a great many people in the cities just now who are anxious to try this plan, and most of them have in mind that they can buy direct at a great saving to themselves, which, of course, does not help the grower very much.

Be all this as it may, I am well and thoroughly convinced that the time will never come that we shall wish to do without the large wholesale handlers of our fruits. The best of them have establishments in the city open the year round. They have regular customers whom they supply throughout the year, at prices we could not hope to secure with our fluctuating crops, an abundance one year and perhaps none the next. These men are organized and are fighting many of our battles, because they are also their own battles. Through them transportation facilities have been much improved, refrigeration has been far developed, and right now the International Apple Shippers' Association is waging a telling war for increased consumption of apples—the one great hope for the thousands upon thousands of newly planted apple trees in the East.

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PROBLEMS IN PRUNING

HERMAN BECKENSTRATER.

Pruning is one of the most important operations in fruit growing. It is so conceded and yet we must admit that our knowledge of this important practice is entirely inadequate to our needs.

Pruning practice is extremely diverse even among our most successful fruit growers. Some prune in winter, some in spring, and some in midsummer, and all for the same purpose. Some slash their trees without mercy, some prune every year, some every other year, and some never prune.

Under this diverse state of practice we can perhaps best approach the problem by asking the question, Why do we prune at all? If we consult the various authorities, books, and bulletins, and the fruit growers themselves, the following are among the reasons generally given:

1. To maintain the tree in such shape and form as will best facilitate the various orchard operations—cultivation, spraying, picking, etc.
2. To keep the head sufficiently open, so that branches do not crowd each other and that sunlight may be admitted.
3. To keep up a supply of vigorous fruiting wood.
4. To maintain or increase the vigor of the tree.
5. To induce fruitfulness.
6. To increase the size and quality of the fruit.
7. To thin the fruit by removing the superfluous fruit buds and thus preventing overbearing.

That the above factors can be greatly influenced by judicious pruning will be admitted by every intelligent person, but just when and how to prune to obtain these various results practices vary widely, as already pointed out. Under these widely varying practices it should not be astonishing at all if the desired results are not always obtained. In fact, they are quite frequently the opposite of what was wanted.

Under these bewildering differences of methods and results it is not at all strange that there should be few lucid conceptions of the problems at issue in pruning and of the factors that modify the results, and there is little literature that treats the subject fundamentally from the fruit grower's standpoint.

In the first place, let us bring before our minds a fruit tree which is developing without any pruning at all. Let us note whether that development is the best obtainable in fruit growing, and, if not, how can we by pruning modify or direct that development for better results.

To begin with, the young tree sends out branches from its trunk. These develop upward and outward from the main axis. These branches have upon

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them a large number of buds. Some of the buds give rise to twigs, and some of these twigs develop into secondary branches. These again form side branches, and so on indefinitely as long as conditions will permit.

Some of the twigs along the branches near the main axis develop into fruit spurs, and in due time the tree commences to bear fruit. There are now hundreds of buds upon the tree, every one of which is capable of developing into a whole tree, like the one upon which they are growing. A fierce struggle for existence sets in. Each bud strives to become a twig, each twig a branch, and each branch a tree. All are striving upward and outward for the coveted light. The terminal buds being more favorably situated in reference to room and light, grow more rapidly and shade their less favorably situated rivals farther back. They become gradually weaker and finally die. The terminal buds continue to grow until they reach the outer limit, and then we have a full-grown, mature tree. Outward growth being no longer possible, a profuse branching now sets in within the border, which now becomes very dense and brush like. We notice also that the fruit spurs which bore the first fruit on the main branches near the trunk have died off, and that the bearing area has moved out with the growth of the branches, leaving a large region within the tree top unproductive. There is only a comparatively thin rim around the outer border of the tree where blossoms open and fruit matures. Thus while the tree was growing it was wasting space without itself. Now that it fully occupies its allotted space it is wasting space within itself. This waste often amounts to one-half the entire land, and sometimes more. On land worth $50 to $100 an acre such an amount of unproductive soil is a serious consideration.

There is a possible remedy for this condition in judicious, systematic, annual pruning. Most of the pruning, however, that is now being done has a decided tendency to augment, rather than to correct, this condition. I shall refer to this again later on. Meanwhile, let us take some further observations on our unpruned tree.

We notice that it is rather high and in spraying we find it rather troublesome to reach its upper branches. When we come to gather the fruit we experience the same difficulty. It takes much time and is rather costly to gather the fruit from such large trees. Besides, is not a large per cent of this fruit culls, and is not the proportion of culls getting larger every year? When the tree was younger and smaller and the fruit was borne lower down along the main branches the fruit was larger, more highly colored, uniform in size, free from blemishes, and practically no culls. Why this change? This question is generally disposed of by saying that young trees are more thrifty and vigorous than old ones, and therefore yield the better fruit.

This explanation does not satisfy me fully. Other plausible explanations could probably be given, but they could not be proven, so nothing would be gained. The greater distance from the source of supply, the many crooks and bends in the branches through which the sap has to pass, and the many points of consumption that have to be supplied may be factors involved in the decreasing size of the fruit.

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However, this may be known from observation, that there is a tendency for the fruit to become smaller as the tree grows older, and that the best fruit is always found upon the youngest bearing wood of any tree.

To illustrate this point permit me to relate what I consider a striking example. I have in mind a Golden Russet tree of about twenty years of age. This tree had not received any regular pruning. It bore profusely, but the apples were very small and irregular. The framework of this tree was composed of three main branches. One night early in spring a storm broke off one of these branches, leaving that side on which the limb broke without any branches at all. Some very vigorous water sprouts started out on the remaining stub. These grew four or five feet the first season and were about an inch through at the base. The following season they commenced to branch and continued a very vigorous growth. The third season they came into bloom with the rest of the tree and they bore the finest apples I ever saw on the tree. They were double the size of those that grew on the old branches.

Now, then, how can we make old trees bear as fine fruit as young ones? Or better still, how can we keep our fruit trees young? "An ounce of prevention is worth a pound of cure." The fact to be borne in mind is that the best fruits grow on the young fruit spurs. If we have young fruit spurs on our trees, we will have large fruit, providing we have a good, vigorous, healthy tree. If this is true, we must prune our trees so that we will have young fruit spurs rather than old ones.

We must remove a certain amount of the old wood and old fruit spurs every year, and an equal number of strong, new shoots must take its place, so that new fruit spurs may be formed. In order to keep the tree young and growing vigorously we must never let it reach its outer limits of growth. Until we can do all this we have not mastered the problem.

I know of no system of pruning that will completely accomplish all this, and, as I have said before, a great deal of the pruning that is now being done has a tendency to augment this undesirable condition rather than to prevent it. One of the most common mistakes and the hardest to overcome is pruning from the bottom upward along the main branches instead of from the top downward. This makes long, bare-limbed, top-heavy trees. This forces all the growth at the ends of the branches, which become too long and too dense at the ends. By commencing at the top and pruning inward the top becomes open and sunlight is admitted. This gives the side branches an opportunity to develop and take the place of the main branches, and then the tree has an opportunity to develop some new wood. This also tends to hold the tree back within its limits of outer growth, while the other method forces it toward it and even beyond it. By judiciously and regularly thinning out the top by cutting back to side branches we follow a system of renewals which will tend to postpone this condition or even put it off indefinitely. This system is now rapidly being adopted by our most progressive fruit growers, and, where it is being practiced with intelligence and good judgment, it is giving satisfactory results.

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DISCUSSION.

Mr. Soper—What time in the summer would you prune?

Professor Beckenstrater—It is difficult to name an exact date. It depends upon the season. The best time is when the growth is beginning to decline. If it is done at that time, the wood production ceases and there is a tendency to the formation of fruit buds. Summer pruning is practiced more in the West than it is in the east. In the case of young trees the summer pruning should not be heavy. When we set out the young tree we prune it so that it will have an open top, and we often let it go and do not look at it until the next season. We then find that the branches have not arranged themselves as we would like to have them. The tree has not developed systematically. For these young trees, summer pruning consists in rubbing off undesirable shoots. When the trees come to bearing age they should be heavily summer pruned if they are making too much wood growth. In other words, the usual winter pruning should be transferred to the summer season. I want particularly to caution you against pruning from the bottom upward along the side. You should commence at the top and cut out the inner branches and leave the side branches for fruit bearing. Open the top so as to admit sunlight. If the top is kept open and the side branches allowed to grow, you will keep up a new supply of fruiting wood and maintain the tree in a higher state of production than any other way.

Mr. Soper—How would you trim the tree the first year, the second year, and the third year?

Professor Beckenstrater—When the tree is set cut it off at the desired height. Watch the growing branches and rub off those that you do not want. By going over the trees in the summer you can regulate the growing of the tree just to suit yourself. The branches that are left should grow 20 inches in length or more. The second spring cut these branches back to 12 or 16 inches in length and watch the development of the secondary branches, saving those that you need and rub off all superfluous buds. The third season these secondary branches should be cut back in a similar way.

Question—How long does it take apple wood to develop fruit buds?

Professor Beckenstrater—Usually apple wood does not produce fruit buds until it is three years old or more.

Question—Should the tree be pruned in winter when it is frozen?

Professor Beckenstrater—Pruning the tree at this time will not hurt it seriously, but it may cause the wood to crack and there is more danger of it drying out, and so dying back of the cut. If the winter is very cold, it is better to wait until warmer weather comes.

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DISCUSSION ON PEACH GROWING.

President Sanger—We have no report on peaches, but discussion is in order.

Mr. Charles Barker—I would like to say a word about peach growing at the present time. A few years ago peach growing became unpopular on this Peninsula because it was unprofitable, and the planting of trees ceased. But we have learned to control diseases and insects, brown rot and curculio, and can plant with assurance of success, and today is a better opportunity for growing peaches than ever before. Peaches will be profitable if they are planted judiciously and on the right kind of land. I would advise planting peaches and apples together, but from two to three times as many peach trees as apple trees, and be sure to get the apple trees far enough apart. We have about two weeks of the market that are bare of peaches, and the Delaware and Maryland fruit grower can have practically that market for peaches for himself. The two best varieties we have are the Belle of Georgia and Elberta. You might extend this list a little by having a few earlier and a few later, but we have only about two weeks of the best market and these two varieties are most excellent varieties for this time. I believe in planting apples and peaches together.

Mr. Derby—This practice is bad from a good many standpoints. For one thing, it is bad for spraying. Plant peaches and late apples together and we certainly find that we are wrong. At the time we stop cultivating the peaches, when the trees are hanging down full of fruit, the late apples need cultivation. Early apples and peaches go better together. I think it is a mistake to plant peaches and apples together.

Mr. J. L. Soper—I believe that it is profitable to plant peach trees and apple trees together. We can grow apples and peaches at the same time and grow them profitably. We have an orchard of peaches and apples and this, the fourth year, sold $7,000 worth of peaches from that orchard. We beleive they are about as fine as you want to look at. We cultivate up to the time the peaches are picked and it is then time to stop cultivating the apple orchard. We never do it later. In spraying we have had peaches and apples with their limbs intermingled and have never noticed injury, and it is certainly a profitable way of doing, and we can have the peaches while we are growing the apples.

NUT CULTURE

PENNELL EMERSON, Wyoming, Del.

The mantle of duty and responsibility as chairman of your committee on Nut Culture has been shifted to my shoulders since your last meeting by the death of a brother member whose name stood first and preceded mine on the

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Committee on Nut Culture. I ask your very considerate indulgence, acknowledging my deficiencies in the qualifications to edify and instruct you to the satisfectory extent and masterly manner of our departed friend and brother, J. W. Kerr, whom I very much respected while living and for whose memory I have a very reverential regard.

NUT CULTURE.

Lives there a man with soul so small
Who faileth annually to recall
His boyhood outings in the fall?
Also who has failed to plant,
Purchase, or in some way grant
A fruit, nut, shade, or ornamental tree
For the future outings of posterity?
Then upon him I would decree
That he be switched or in some way tree-d
For neglect of duty, in some degree,
By order of this Society.

Sixteen years ago I submitted to your most worthy Secretary for publication a report on Nut Culture in manuscript, and prefaced, or commenced it with the above original poetical effort, and I can truthfully say I have never offered him in manuscript a poetical or prose effort since on any subject. When I received the printed report of the proceedings of that meeting, which I think was held at Snow Hill, I was so ashamed of the poetical part of it especially, and the entire article generally, that I have never visited Snow Hill, and but few of the horticultural meetings, since, and have wished that I had buried that report in a snow or sand hill, even if I had had to have walked 16 miles to have done so, instead of sending it for publication until I had had a proof taken of it so that I could have changed it somewhat, yes, a whole lot. I rather prided myself on my penmanship, but since then I do not trust it for publication. Well, I stated in that article that I had planted, three years previously, about an acre to one-year grafted Ridgely chestnut trees, and a few years afterwards I extended my plantings of the same variety to an extent of about three acres, and I emphatically declare that while I believe 10 per cent of my trees are showing evidence of the chestnut blight, or bark fungus disease, they have paid me handsomely and afforded myself and family and others a great deal of delight and pleasure. As I have practiced diversified farming to quite an extent for the past twenty years with pleasurable and profitable results, I will digress a little at the conclusion of this report from the subject assigned me to ask your kind indulgence and patience, as my periods of effort of this kind seem to be timed like the visitation of the locusts, every sixteen years, consequently you can relieve your minds of the probability of having to suffer a recurrence. I am anxious to furnish, even in a small degree (pardon my vanity) satisfactory and conclu-

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sive evidence of the relationship, although quite distant, to Ralph Waldo, and the potency, power, and influence of heredity extending through generations.

Now, to get back to the prosy part of this job, I will state that I think I have shipped in one season 50 bushels of chestnuts from the aforesaid three acres, which sold from 7 to 20 cents per pound, say an average of 9 to 10 cents per pound. Fifty bushels would be about 2,500 pounds, which, at 9 cents per pound, would be $225, or about $75 per acre. Considering the small cultural and marketing expense, comparatively speaking, this is much better than I ever realized from corn, wheat, or any of the grain crops, or from potatoes, cantaloupes, tomatoes, or any of the vegetable crops. Not quite as good results as I have had from apples, but, by way of diversity of crops and diversion of mind, considering the utilization of stumpy, rough ground, I feel that I have succeeded in chestnut culture up to the present, but feel guilty of neglect of effort to apply the remedy that we have been so persistently applying to all other fungus troubles, namely, one of the fungicides.

The chestnut groves in our immediate neighborhood are being heavily drawn upon for telegraph and telephone poles, fence posts, and lumber, and it behooves us to find a remedy for the succeeding growth. It is not becoming the spirit of this scientific age to be easily discouraged or dismayed.

"For every evil under the sun
There's a remedy, or there's none;
If there's one, try and find it,
If there's none, never mind it."

Like all other products of the land, we are up against the problem of marketing the chestnut, and if the farmer and fruit grower don't organize co-operative selling and buying associations and become a unit of sufficient influence to properly and justly protect his interests, he can not boast of doing business according to commercial standards, but will simply continue to be a producer, furnishing the commercial world with the material and opportunity to do the business. If all the machinery, fertilizer, building materials, etc., he buys comes from and through concerns which control the markets and thus maintain very profitable prices, and all the produce he sells goes to or through concerns which control the market and thus are able to name the price to both producer and consumer, the farmer is surely between the upper and nether millstones of the commercial world.

Early in the season, before the chestnut burrs are open, the country is flooded with postal cards by commission houses making specialty of chestnuts, quoting $12 and $14 per bushel. Such prices put the grower and others busy gathering, with the consequence that he is kept busy some time after he gets his returns trying to find a satisfactory reason for the great difference between the prices quoted him and what he has received.

Another very galling prefix is being used in the price currents. Instead of quoting the named varieties, they are using the word cultivated. I used to get 20 cents per pound for first shipments of the Japanese and 15 cents for

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the Ridgely, but since the word cultivated has been used to designate the larger sized nuts, they of course should sell at a less price, for anything that is cultivated don't cost as much as if it grows without cultivation. We are driven to the task of producing an early ripening variety of small size, possibly by crossing the Japanese with the chinquepin, or of learning how to treat the nuts to hold and put them upon the market in less quantities and over a longer period.

To kill the worms in chestnuts, the Zoological Press Bulletin, of the Pennsylvania Department of Agriculture, states: Put the nuts, immediately after gathering, in a vessel like a wash boiler, and pour upon them a few ounces of carbon bisulphide. Close the vessel tight for a day and the larva will be killed. By sufficient ventilation the odor will entirely disappear.

The English or Persian walnut trees that I planted about 1888 commenced to bear in five years and have increased in quantity each year, and although seedling trees as they were, and also the dozen or so that I have planted since, they are a great source of pleasure and some profit, as we usually have more than we consume and readily get 17 cents per pound for them at our local stores, where they and our neighbors pronounce them superior in quality to the California or foreign ones. Considering the large territory over which the Persian walnut can be grown and the great demand for the nuts, many more trees of this walnut should be planted, considering the ease with which seedling trees can be raised.

To be successful in sowing the nuts of walnuts they must not be kept dry for any length of time. Within a few weeks of their ripening they should be mixed with slightly moist sand, then be kept in a cool cellar all winter, sowing them outdoors as soon as winter closes, not before. While all seedling trees will produce nuts varying in characteristics, I have no tree producing undesirable nuts. I would further state that nuts for planting should be selected from isolated trees, especially the Japanese, for I had them to produce nuts which have all the external characteristics of the butternut.

While I have quite a number of Japanese walnuts in bearing (Juglans Cordiformis and J. Sieboldiana) I would recommend the growing of the J. Cordiformis in preference to the Sieboldiana. It is heart-shaped, about the size of shellbarks, and nearly as meaty, and of good quality. They are more hardy and the foliage more rust resistant than the Persian, rapid growing, and foliage of a refreshing shade of green. They sold for 4 cents per pound on the Philadelphia market this year. I have planted but one shellbark hickory, which has not come into bearing yet.

The pecan trees that I reported about planting are now bearing quite a quantity of nice-sized nuts of good quality, and are enjoyed immensely by the school children that pass that way, as well as ourselves, and are likely to furnish delight and pleasure to succeeding generations.

We do not know of any attempt to grow the pecan in the colder States. It is usually considered as one for the South alone, being a native there, but that it is capable of standing zero and lower has been proved in several

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instances, and there can be but little doubt that it could be grown profitably much farther north than has been attempted. A recent circular from the United States Department of Agriculture has this to say of it:

"Until recent years planters of pecan trees have been greatly handicapped in the selection of varieties because of the limited number of choice sorts which have shown special adaptability to particular localities. At present there are about fifty sorts of sufficient merit to make it possible to select varieties reasonably certain to succeed in any pecan growing locality. Among these are the Burkett, Major, Owens, Warrick, and Havens. The Burkett produces from 50 to 55 nuts per pound and is of a roundish, oblong form; the Major produces from 85 to 90 nuts per pound and has a roundish, oblong form, tapering slightly at the base; the Owens averages from 60 to 65 nuts per pound and has an oblong, oval form, with tapering base and apex; the Warrick is rather below the medium in size, and averages from 75 to 80 nuts per pound, has an oblong form with a rather short apex, but no longer base; the Havens variety is medium to large sized, averaging from 65 to 70 nuts per pound, and has an oblong form with sharp base and blunt apex."

There is one thing that may cause some to doubt the hardiness of the pecan, which is that, in common with all southern trees, it continues growing later in autumn than do northern ones, preventing the proper ripening of the wood. After a few years' residence in the North it becomes wise and does as northern trees do, ripening its shoots and shedding its foliage earlier in the season. In the eastern part of Pennsylvania the pecan has been planted, the writer knowing of one which was over 50 feet in height. It bore nuts, but was not of a large size, such as are now obtainable from planting a better sort.

The black walnuts are doing nicely. I consider them a valuable tree. Have not noticed any serious injury from insects or diseases. The black walnut should be gathered and marketed before Hallowe'en to obtain best prices. I have read that the black walnut should be gathered before they drop, immediately after it is ripe, and not allow them to remain in the hull. Dry them quickly and the kernels will be white and delicious, with no strong and flat taste. It is then easier to crack. Hundreds of bushels are used by large confectionery firms. The foresters of Europe look to us to supply them with the nuts for raising seedling trees for their forest lands for the sake of the timber.

FILBERTS.

I have had less blight since I have practiced thinning out of the growth. Have lately read that to obtain greater quantity of nuts it is advisable to have quite a number of several bushes of trees growing near each other to insure better pollenization, as the male (catkin) and female flowers do not always appear at the same time on each tree or bush. The female flower is quite small, red colored, and very rarely noticed on other nut trees as well as hazels, and I might here state that I used to think that the catkins on the walnut were the only flowers and that the walnuts formed when the catkins

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appeared, but since the use of the aeroplane and aerial navigation we have been able to observe downward more extensively and fatally than formerly or previously. We find on the limbs beneath the hanging catkins are the little upright, red-colored female flowers, ready to receive the pollen which falls or is wafted by the winds from the catkins higher up. This plan or idea might be followed in planting other nut-bearing trees, as we think some varieties of fruit trees are not sufficiently self-pollenizing and are alternating other varieties with them in orchard planting. But do not rely on fertilization of pollen altegether. I have increased the yield of 15-year-old orchard, solidly planted to Kieffers, from 300 baskets to 3,500 in one year, and then to 4,000 baskets in the next year by sowing to cowpeas, then to rye, then following during the winter with a light application of manure. But I am getting off the subject somewhat, and, returning to same, it is stated that the filbert and hazelnut are not distinct; both are really hazels, but the name filbert is applied to those hazels that have the husk growing completely over the nuts, some of them even forming a long point where the husk overlaps the nut. The filberts are to be preferred because of their larger size, and among them are some larger and more prolific than others, which are propagated from layers to be sure of having the true kind. Nurserymen usually propagate several distinct sorts. Those who make a business of growing either the hazel or the filbert say they must not be grown as bushes, but in tree shape as far as practicable. They say when grown as bushes they are not nearly as productive as when grown with a trunk, in tree shape. It is claimed that the filbert does not produce as many flowers as desirable and that, in consequence, the planting of the common hazel near them to assist in fertilization is to be recommended.

I am still growing filberts in a small way, in spite of the blight.

Every homested should have a full supply of our valuable nuts. These trees offer the best means of utilizing rough and broken lands, also arid land, and, in some cases, the best of lands.

DIVERSIFIED FARMING.

With dog and gun, boat and seine,
  Hog and hominy, a little wheat;
Our fathers furnished us in the main,
  Until they taught us the peach to eat.

This thoroughly revolutionized our brain;
  We planted our land to them almost o'er;
And treating them badly in the main,
  They refused to serve us as of yore.

We then planted berries and asparagus roots,
  And wisely extended to apples, grapes, and pears;
And continued extending with the several small fruits,
  To increase our comforts, as well as those of our heirs.

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Now with cowpeas, rye, and the good scarlet clover,
  Your berries and tree fruits better attended,
You can keep clear of debt and have something over,
  And thank the dear Lord some troubles amended.

Let us cherish the peach and attend to the clover,
  And also small fruits, apples, grapes, and pears;
For many hard times they have tided us over,
  Although considered such perishable wares.

Leave the markets for grain to those farther West,
  The markets of the East for fruits hold fast;
With intelligent effort, doing your best,
  You'll come out financially O. K. at last.

Let's sport at times with hook and line,
  And also tramp with dog and gun;
But leave footprints in the sands of time
  That others may more safely run.

REPORT ON GRAPES FOR 1913

G. FRANK GOOTEE, Clayton, Del.

The grape crop on the Maryland-Delaware Peninsula for the year 1913 was a decidedly short crop. All growers report from one-half to two-thirds of a normal crop. Why the net returns per carrier were no more is hard to understand, as, notwithstanding the reduced crop, the quality was as good as usual, while the prices paid by buyers, or net returns from commission men, were no higher than for 1912, when we had a full crop. There is now within a radius of 5 miles of Clayton and Smyrna, about 300 acres of grapes in bearing, and many growers still setting. The same may be said for the section around Dover. What we need with us is a grape juice factory, and if this should meet the eye of any manufacturer of grape juice, I would be very glad to correspond with him. While grapes have been very profitable in years gone by in this section, I think the era of high prices for them is past, as increased production to the south of us gets the high price we formerly received for our early grapes. Indeed, on account of its earliness the Moore's Early have been far more profitable with me than Concord, though the yield has been less. These are our best market varieties. Quite a number of Niagaras are grown, but practically none being planted now. The Niagara is the best white grape for this section, but comes in with Concord and does not sell for any more money. It is more susceptible to plant diseases and not as good a grower or heavy a bearer generally as the Concord.

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Among the reds the Delaware is the best and sells for higher prices, but on account of being a poor yielder is not grown to a large extent.

Now, as to cultural methods. Any red clay land that will grow corn will grow grapes. The old notion that grapes would only grow on hillsides is wrong, as most of our vineyards are on level fields, where water does not stand. A vineyard must have good drainage, as it will not stand wet feet. In this section they are nearly all grown on a trellis of two wires. The rows 9 feet apart and the vines 8 feet apart in rows, of about fifty vines. Heavy end posts, of chestnut mostly, are planted deeply in the ground at both ends of the row, with light poles of cedar to hold up the two wires, every third vine in the row. We plow shallow, not over 3 inches deep, early in the spring, and keep cultivating once a week until the last week in July.

Grapes require plenty of fertilizing material. My practice is to broadcast manure once in three years, scarlet clover once in two years, 1,000 pounds to the acre of bone and potash, 1,600 pounds of bone, and 400 pounds of muriate every two years.

We spray three or four times, according to weather conditions, with Bordeaux mixture. When troubled with rose bugs we add to the Bordeaux mixture 4 pounds of arsenate of lead with 10 pounds of glucose, or 2 gallons of cheap molasses, to 50 gallons of water, and find it very effective, as hand picking of rose bugs is too expensive. Still, if they are very numerous, you may have to hand pick some.

Grapes are an expensive crop to put on the market, as the price of the package does not lower any, yet the price of the grapes does. In the good old days of long ago we used to get $2 to $3 for quite a few of the first shipments of Moore's. Now $1 to $1.50 is high, and by the time Concords come on the price is pretty well down. We need more buyers in this section, as we all want to sell and to know what we are getting every day. We use the eight-till, 24-pound case in this section, which costs about 14 cents at station. Most of us have tried the 4 and 8 pound basket, but think grapes net us more money in the cases.

On the whole, the outlook for grape production on the Peninsula is very bright, and with a few grape juice factories and more buyers we would be better satisfied.

NEW FRUITS

W. F. ALLEN, Salisbury, Md.

The Chesapeake strawberry is a comparatively new variety and it is probably the most popular berry on the market. It is two or three days earlier than the Gandy and will produce a crop on a lighter soil than is required by the Gandy. The fruit of the Chesapeake is borne on large stems, the greater portion of which stand upright, holding the fruit from the ground.

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It does not set an immense quantity of fruit, but every blossom makes a berry. Some people say that this variety does not bear enough fruit. I think this is a strong point in its favor, for every berry is a fancy berry, or at least, if the crop is well grown, a large part of the fruit is fancy. I was in Connecticut last summer and visited the farm of J. W. Nichols. He grows many varieties of strawberries and told me he had just shipped sixty crates of the Chesapeake which were the finest he ever saw. They sold in Boston for from 20 to 22 cents per quart.

The Rewastico is another new strawberry that I expect to find coming to the front. It was originated in Wicomico County, Maryland, by Thomas H. Howard, who has been growing this variety for several years. It is a highly colored, large cardinal berry and the color penetrates through and through; very productive, uniform in shape, and one of the healthiest plants on my farm. In quality it is rich and aromatic, though somewhat tart. It is firm enough to be very popular as a market berry.

The Early Ozark, said to be a cross between Excelsior and the Aroma, was originated in Missouri. It is the best large, early, firm market berry that I know off. It is a healthy grower and makes many plants.

The Gold Dollar is another variety from the West. I do not like the name, but it is a good berry. It is a good all-round, mid-season berry, immensely productive and firm, and good for any market when shipped in refrigerator cars. It is not as firm as the Chesapeake, but will ship all right. It is uniform in size.

July produces berries medium size, is later than the Gandy, in fact, the latest berry that I have grown. The berries are firm and attractive. It is very productive. It blooms so late that it is seldom injured by frost.

The Ohio Boy is another new strawberry, in vigor and productiveness like the Bederwood, with fruit much larger in size and firm enough to make an excellent shipping berry. It is a good home berry, as it runs through a long season, and there is a possibility that it will make a good market berry.

Another good one is the Orem, a rather small plant, but it gives a large crop of large berries. It commences to ripen with the Gandy, but lasts after the Gandy is gone. It is more productive than Gandy, larger in size, firmer and attractive in appearance.

I failed to mention the Amanda. It is a strong growing plant, vigorous and healthy, large, beautifully colored, firm berries. It is like the Bubaugh, except that it is twice as productive.

Some of us who have kept tab on who was who in strawberry culture know S. H. Warren, of Massachusetts. Mr. Warren is 77 years old, but still interested in strawberry culture, and last year offered to the public, through the speaker, what will probably be his last variety. He has brought out quite a number and he says that this is the best one. I was at his place two years ago and saw this berry fruiting. It was fine. Mr. Warren exhibited it in Boston at Horticultural Hall and it was the largest and most beautiful in his collection. It has been named Warren. I do not know how it will

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do for market, but you need not hesitate to plant it for your home table.

There is great interest in fall strawberries. I have tried the most of them and have discarded all but three—Progressive, Superb, and Americus. They should be planted on rather dry soils. You should not expect them to bear a full crop in the spring and keep bearing from May until December. You should keep the blossoms out until the first of July and you will have strawberries until frosty weather. I do not know that any of these berries will be valuable for market, but they are valuable for the home table. The Progressive is the best and the largest, and a good bearer. I counted the berries, red and green, and the blossoms, and found 136 on one plant. Many other plants had more than 100 fruits and blossoms at the same time. In my patch of Progressives, three-fourths of an acre, we picked, from September through October, from 75 to 100 quarts two or three times every week. They continue to bear until frost if you do not fail to keep the blossoms picked off early in the season. The Superb is next in value to the Progressive. Both plants and fruit are larger than the Progressive. The Americus is of high quality and is very firm, and the plant is strong and healthy.

I recently found a new dewberry and named it Atlantic. It is more vigorous and a stronger grower than either the Lucretia or Austin, and for that reason should be planted further apart. I plant the rows 7 feet apart and the plants 4 or 5 feet apart in the row. It comes along after the other varieties are gone and is so firm that you can ship it to Chicago if you want to.

The Joy is a new blackberry that originated in New Jersey. I have not fruited it, but think it is all right.

In raspberries you should not overlook the St. Regis. If you go to the Reading Terminal Market in Philadelphia in the fall, you will find the St. Regis there in quantity. It bears a full crop in the spring, but continues to blossom and set fruit and will give you great clusters in the fall. It is a strong, healthy grower. The June is another new red raspberry that has been sent out from the Geneva Experiment Station. I have not seen it, but you want to keep it in mind.

A new gooseberry was recently originated in Wisconsin by a Mr. Ridpath, who named it Carrie in honor of his wife. It is similar to Houghton, but is free from mildew and is twice as vigorous and 50 per cent larger in size. It is the only variety of gooseberries that I have been able to propagate from cuttings.

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HORTICULTURAL EDUCATION

By THOMAS B. SYMONS, Dean, School of Horticulture, Maryland Agricultural College.

The field of horticultural education is beyond the scope of a paper such as is practical to present to this society. It is, then, only possible to discuss the general aspects of the subject, and those only in a brief manner. When preparing this paper I tried to figure out the purpose of this society in having a committee on this general subject. Was the idea to have such a committee report the progress of horticultural education during the past year, or was it desired to have the subject discussed in stages from year to year? The former has not been practiced and the latter was not pointed out in notifying me as chairman of the committee. Perhaps the purpose of the society was to have members of this committee make certain observations on the subject, as would occur to individuals from time to time, and this is all I can say for this report.

Horticultural education, and education in any of its phases, simply adds power to men, makes our labor more productive. It is a curious fact that a few years ago the Department of Agriculture undertook to ascertain the relationship between the education of our people and their productive power, and, in the course of that investigation in the United States, they found that the average number of years that our people attended school for the United States was 4.3 years, and at the same time in Massachusetts the average school attendance was 7 years, so that the ratio of the United States to Massachusetts was 4 to 7. At the same time they took into consideration the productive power of the people, and it was found that the ratio of the productive power of the people of the United States to those of Massachusetts was as 40.5 to 70. This shows in a way that the productivity of a people depends upon their education, and that has been our history, for we know that natural resources, native ability, and education constitute the basis of productive power of a nation, and while the Indians had natural resources and native ability, they lacked education. The coming of the white man has brought the development to pass in this country.

In any walk of life we can see the comparison between education and productive power.

When we consider horticultural education I wonder if it would be amiss to give you some statistics regarding the horticulture of this Peninsula. Sometimes the word has been interpreted to mean pomology, or, we speak of a

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horticultural meeting as a fruit grower's meeting. It is true that our horticultural societies in the East have had a tendency along these lines. In some States they are called fruit growers' associations. We represent more when we speak of horticulture. Horticulture stands not only for tree fruit growing, but for small fruits, vegetables, floriculture, and landscape gardening.

When we come to analyze the situation on this Peninsula we find that tree fruits only represent a small per cent of investment and revenue, as compared with other phases of horticulture, such as vegetables, small fruits, floriculture, and landscape gardening. The recent census gives us these figures for this Peninsula:

The figures by counties on the Eastern Shore and Delaware are as follows:

MARYLAND.

County.	Fruits and Nuts.	Vegetables
Caroline	$158,481	$495,217
Cecil	44,815	168,751
Dorchester	45,339	597,897
Kent	131,011	220,164
Queen Anne's	41,412	158,962
Somerset	243,679	291,414
Talbot	29,898	255,838
Wicomico	195,451	294,138
Worcester	101,049	381,500
	$991,135	$2,963,881

DELAWARE.

Kent	$231,803	$573,433
Newcastle	100,915	359,771
Sussex	557,718	899,495
	$890,436	$1,832,699
Total value for both States	$1,881,571	$4,796,580

The census does not discrimiate between small fruits and tree fruits in the county values, so that we shall have to compare these values by taking figures for each State.

For Maryland:

Census 1909—Orchard fruits and nuts	$1,517,400
Small fruits, principally strawberries, blackberries, and raspberries	1,227,548

For Delaware:

Census 1909—Orchard fruits and nuts	195,766
Small fruits	649,732

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Floriculture is also only given by States.

For Maryland:	
(1909)	$1,053,901
For Delaware:	
(1909)	110,486

While it is not convenient to divide the value of small fruits and orchard fruits for the nine counties of the Eastern Shore, the per cent of difference between these figures in Delaware is 10 per cent more for small fruits than orchard fruits, and this gives an idea of the difference in the Maryland counties, where conditions are about the same.

To summarize for the States, we have:

Maryland:	
Orchard fruits	$1,517,400
Small fruits	1,227,548
Vegetables	7,996,105
Floriculture	1,053,901
Delaware:	
Orchard fruits	195,766
Small fruits	649,732
Vegetables	1,832,699
Floriculture	110,486

Note.—The census year 1909 was one almost entire failure of tree fruits on the Peninsula. The shipments over the Delaware railroad in that year were: Apples, 92,015 baskets; peaches, 11,474 baskets; pears, 389,567 baskets; while in 1910 they were—apples, 661,365 baskets; peaches, 966,671 baskets; pears, 1,262,147 baskets.—**The Secretary.**

It thus behooves us to give greater attention to these other phases of horticulture, so that they will progress with orchard fruit growers. It is my belief that a meeting of this character could, with much profit, be devoted solely to the tomato and potato crops of this Peninsula, two crops that represent probably five times as much investment as does orchard fruits. The same may be said of the strawberry, a leading money-maker of this region. In other words, I hope to see our societies' program divided into sections, so that an opportunity will be given the growers of these crops to discuss the best means of increasing production and quality of the product, and, more important still, the most effective and satisfactory manner of disposing of same; for, it must be remembered, that selling the product satisfactorily is, in many instances, as important as growing the crop. Horticultural education should include the science of selling as well as the science of growing. This is no criticism of this society's program; it applies to the Maryland, as well as the others in adjoining States. The trouble has been that the fruit grower attends the

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meetings and the trucker, generally, does not. May it be said that the fruit grower more thoroughly appreciates the need for these annual conferences, while the trucker is too busy to attend. Nevertheless, we should encourage the latter, or else some day we will hear of the tomato or strawberry grower associations of the Peninsula.

There is no greater region in the world for the development of all phases of horticulture, and I am glad to say I believe the opportunities are being appreciated more and more by our people.

The development of fruit growing in Talbot County during the past year is an illustration. Horticultural education brought first prize on best twenty-five boxes of apples at the recent "Maryland Week" show, which was awarded the President of this association. For several years Mr. Sanger has been the lone star of apple publicity for Talbot County. Others will soon, I hope, follow. The same is true of many other counties of the Eastern Shore of Maryland. Horticultural education is only beginning to speak on this Peninsula.

Horticultural education can best speak through demonstration work, as was the case in Mr. Harrison's peach orchard this summer, where a demonstration by our department in controlling brown rot netted him $25,868 from 10,000 peach trees planted on less than 100 acres. The spraying cost a little over $2,000. The year before he lost practically the whole crop. I hope both the Delaware and Maryland institutions will be so provided with funds that we can conduct such demonstration work in every community of the Peninsula. It will be a good investment for each State.

While on a short visit to the county this summer I observed a field of tomatoes grown by Mr. Harry Kemp producing 14 tons per acre. How many tomato growers in Maryland and Delaware produced this kind of a crop? And yet Mr. Kemp produces from 10 to 12 tons every year. He has horticultural education on tomato growing. So it goes with every crop; we must learn its characteristics, needs, and culture methods to produce results.

In the case of apples or other tree fruits it is not best to have phenomenal or "bumper crops." Such yields are a severe tax on trees, from which they may not recover in years. There are better ideals than merely to produce unusual crops on an orchard.

In closing this report I wish to point out the desirability of continuing the investigational side of horticultural education in all our institutions, and the growers should insist that funds are provided for this important work. While I believe in the benefits to be derived from demonstration work, yet we must not lose sight of the many problems that are now unsolved and the need for more light on every side. Further, I should like to know how much horticultural education is being taught in the public schools on this Peninsula. In a country where its future, to my mind, depends upon horticultural development in all its phases—for I believe this garden should feed the 10,000,000 of souls within 200 miles—I ask how much of this training is being given the rising generation? Seventy-five per cent of our boys and girls will probably go no further than the public schools. Is it not possible for us to give them

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more vocational education along horticultural and agricultural lines? I hope we will soon see our boys and girls discussing some questions of horticultural education in the public schools. They will then be better prepared to take part in the discussions at these future meetings.

This, I will admit, is a peculiar report on horticultural education, but I have tried to discuss some practical phases of the subject, which should be given attention, rather than a theoretical report on higher education.

FLORICULTURE

MRS. W. IRVING WALKER.

There are three divisions of floriculture which I was in hopes our committee might present separately, and so requested, but for various reasons we are not only deprived of the presence of ladies, but the entire subject seems to have been left to me.

My object in subdividing it into hothouse, yard, and home was the belief that these three divisions have a distinction such as would appeal to at least some members present.

I have had no experience with hothouses, but with the house plants am careful to get good, rich earth, rather light; then it will not pack and harden in the pots. I use about 4 inches of topsoil, from a little place through which the barnyard drains, and get enough each year for the pot plants from a very little space.

Old plants can be lifted and taken in, but the best blooms come from plants started in August or first of September. Especially is this true of geraniums and scarlet sage. The latter grows very easy from cuttings and makes a fine winter bloomer.

After potting plants keep them in a place where the sun does not shine on them more than a couple of hours daily. It is well to keep them on a porch, the roof of which serves as a protection from frost, should one come early. Leave them out until frost, which hardens them off and makes them hardier after removal to the house. It is best to water only when needed, then give sufficient to make the earth wet, unless there is danger from freezing, then it is best to let them droop for several days, until weather moderates, before watering.

The plants need plenty of fresh air daily and, if in a place where wind does not blow on them, are better by the room being aired, even in quite cold weather. If there are sunny windows, geraniums, begonias, and scarlet sage and sultanas will bloom all winter. Some coleus will grow and make pretty

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decorative plants, but frequently lose their bright colors. Parlor ivy or Kenilworth ivy will cover pots if six or eight pieces are planted when plants are prepared for the house.

In windows which do not have sun, ferns, palms, etc., may be kept.

Flowering bulbs can be potted and grown in the cellar or dark until roots make their appearance out of the bottom of the pot; then bring out to light, when they will bloom in a few weeks, so that a succession of these flowers can be had in winter. Even lilies of the valley, if frozen before bringing into the house, will bloom in a short time.

Pretty table pieces can be kept by having two pots of fern or small vines, keeping one in a window a week, then changing with the one on the table.

In the yard I try to have flowering plants all the year, the flowering bulbs blossoming sometimes before all the snow has disappeared. Then come wisteria, lilacs, magnolia, flowering almond, and shrubs of all kinds, with lilies of the valley, flags, and columbine make one thing blooming at its best each week until roses come. After this we must depend upon the small flower or bedding plants until the arrival of dahlias, which bloom from July until frost. Golden glow, gladiola, tuberose, cosmos, and chrysanthemums are our fall flowers, after which, in a sunny sheltered spot the single perfume violets, with a little protection of leaves, will of an open winter bloom until spring flowers start again.

These are the cultivated plants, but almost the year through there are as many and as beautiful flowers blooming wild if we will but take the trouble to know where and when they bloom and in what kind of place they are to be found and go to their homes to look for them.

ORNAMENTATION OF HOME GROUNDS

By LESTER LOVETT, Milford, Del.

I have been asked to speak for a few minutes on the subject "Ornamentation of Home Grounds" and, with your permission, I will confine my remarks to the subject as it concerns the grounds of the average fruit grower or farmer, avoiding all technical terms and botanical names, for by so doing I believe I can make myself more clearly understood. Moreover, when speaking of plantings my remarks will refer exclusively to native stock.

The first thing to consider in the embellishment of home grounds is the grading and building of drives and walks.

See that there is, at least, a slight fall in the grade from the house in all directions, and that it is gradual, not uneven. To get the proper grade

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it will probably be necessary to either fill in or take out soil in certain parts of the prospective lawn. Before doing either, strip what surface soil now is there, and then take out or fill in the necessary amount of subsoil to bring the grade within 9 inches of where the finished grade should be. Then spread back the topsoil, having the same not less than 9 inches deep over entire proposed lawn. After this is done spread a 3-inch depth of well-rotted manure over the entire surface and fork this in. Harrow the ground thoroughly and rake; then sow a good mixture of grass seed, using not less than 3 bushels to the acre. After the grass has become established do not cut it too close, for if you do this too soon you will kill out the finer grasses.

In road building remove all surface soil to an average depth of 8 inches or more, leaving center of subgrade 3 inches higher than that at sides of drive. Then fill in with gravel or clay, or both, using clay below gravel. When finished the sides of drive should be only about one-half inch below grade of adjoining lawn and center of drive 3 inches higher. Roll the drive repeatedly while it is getting set, and at every opportunity thereafter. Make walks in the same manner as suggested for drives, but it is not necessary to use so great a depth of material, from 4 to 6 inches being sufficient.

Regarding contemplated plantings permit me to give a few general rules which it would be well to observe.

Make plantings against the boundaries of your property; against the walks and drives and against the house, but do not break the lawn with plantings, be they formal or otherwise.

When possible avoid straight lines in making plantings, and also in locating walks and drives.

Plant high-branched trees near the house, so as to have shade without the danger of having breezes cut off by low-hanging limbs.

Screen, by planting, any unsightly or undesirable buildings.

Do not allow any plantings to hide pleasant views, such as a distant hill, a stretch of water, or an attractive grove of trees, but rather plant so as to frame such a picture.

Eliminate, by planting, all sharp angles, such as would be made by a fence or hedge coming in contact with another fence or hedge, thus forming a right angle, an obtuse or acute angle. For the same reason plant, if possible, low-growing plants against the house, to eliminate the angle made by the house coming in contact with the ground.

We fruit growers of this Peninsula can make almost any desired planting on our grounds without buying a plant of any kind. Our native trees, both deciduous and evergreen, as well as our native shrubs and hardy perennials, can not only be made use of but should give as good results as the average nursery-grown product. To be sure, greater care will have to be exercised in the transplanting of native stock, but it can be done and has repeatedly been done satisfactorily.

What is more beautiful than our American holly? Yet few of us fully appreciate this grand tree merely because it grows wild; and our dogwood

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and laurel! More beautiful varieties than these can not be found in any nursery in this or any other country.

Our scarlet and sugar maples, various oaks, tulip tree, linden, elm, birch, beech, ash, and box elder are all desirable shade trees, and much sought after by landscape gardeners. Yet we have all of these in abundance and can have them where we wish on our grounds merely for the digging. The same is true of our native shrubs, such as bayberry, sweet pepper bush, wild rose, shad bush, azaleas, etc., and our native hardy herbaceous plants are too numerous to attempt to enumerate.

There is one native perennial, however, that I must call to your attention, and that is the butterfly weed. You have all seen growing along the roadside specimens of this plant, with its numerous bright orange blossoms, which you must certainly have admired. Just imagine what a magnificent display you can have on your lawn by massing ten or twenty of these plants in one group.

There is little to be gained by my giving you a list of native plants that especially appeal to me. By using good common sense in the transplanting you can have on your home grounds any variety of native tree or plant that you find and admire.

I would, however, remind you to give each variety, as nearly as possible, the same conditions it had where growing wild. For instance, one could hardly expect a magnolia, coming from a swampy spot, to thrive if moved to a high, dry place; nor laurel moved from a shady spot to do well if planted in an exposed, sunny location.

A few suggestions pertaining to transplanting native stock might not be amiss:

Regarding deciduous trees, unless very large, transplant as early in spring as frost is out of the ground; in midwinter, if we have an open season, or in fall after the foliage has dropped; in short, at any time that the tree is in a dormant condition and that we can get in the ground. In digging the tree get all the roots possible, and cut smoothly all those that become broken in the digging. Cut back the top considerably; use nothing but the best surface soil in planting, and mix with this a liberal quantity of well-rotted manure. Firm the soil well around the tree, and do this when planting all kinds of trees, both evergreen and deciduous, as well as shrubs.

If the tree is very large, move it in midwinter with a frozen ball of earth, using every precaution suggested for transplanting smaller trees.

Transplant deciduous shrubs in the same way as suggested for deciduous trees and trim severely.

Evergreen trees and shrubs should be moved in April or early in May unless very large. If large, move in midwinter with balls of earth as advised regarding large deciduous trees. Never permit the roots of evergreens to become dry while out of the ground, as the tree will surely die if they do become thoroughly dried. Use water copiously in the planting.

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When transplanting holly remove every leaf, preferably with a shears or scissors, but do not injure the buds. If holly is treated in this manner and moved in April, there should be but little danger of loss.

I would advise against the transplanting of native pines, excepting white pines, and against the various nut trees, unless very great care is exercised in the work.

Native hardy perennials can be moved in spring or fall with little danger of loss. Native ferns should be moved in spring just as the fronds are appearing above ground.

A few plantings especially recommended are:

Red cedars, sometimes called upland cedars, for screening purposes, and white birch planted among them, the dark green of the cedars bringing out the white of the birch in beautiful contrast.

Where it is usually damp, for instance, near the well, three or four magnolias, and at their base some cardinal flowers.

In the shade of large trees some wild violets and some Star of Bethlehem or some wild lily of the valley. If very dark and damp, a few trailing arbutus would help cover the ground.

For fall foliage effects, scarlet and sugar maples, used in conjunction with dogwoods and the various sumachs.

If there is no shade on the grounds, and some laurel are desired, plant same where you will, and plant some dogwoods among them. The dogwoods will furnish the necessary shade for the laurel and add to the attractiveness of the planting.

A fine individual holly, one with berries, planted where it can develop into a fine specimen, would be an object of beauty.

Hardy ferns in a damp, dark recess, such as is often found, and where no grass can be grown.

In addition to the pleasure we must derive in embellishing our properties, other reasons for which we should do such work are:

To enhance the value of our property, for it is claimed that for 1 per cent of expense in doing such work the average property would sell for an increase of 40 per cent, and this is claimed by the largest real estate operators in this country. To make our homes more attractive to ourselves as well as to our friends; to make our homes places in which we can take a just pride. If more farm homes were beautified in this way, fewer of our boys and girls would look for an opportunity to move to the city, because they would be proud of their country homes and the thought of leaving would not enter their minds.

So let us be up and doing. By ornamenting our grounds we have everything to gain with no chance for loss.

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REPORT OF COMMITTEE ON FUNGOUS DISEASES

THOS. F. MANNS, Plant Pathologist, Delaware College, Newark, Del.

The speaker represented the Delaware State Board of Agriculture at the public hearing before the Federal Horticultural Board in Washington, December 18, 1913. Probably three hundred men were in attendance. Farmers, Senators, Representatives, grangers, brokers, pathologists for once met on a common basis. To say that the farmer and granger are not live wires in this day and age is a mistaken idea. By the number of telegrams, petitions, and special-delivery letters carried into the meeting by some of those Western Senators and Representatives one would conclude they would be decapitated if they failed to show up before that Federal Horticultural Board. The exhibit of diseased potatoes that had been imported from Holland and Belgium was an eye opener. Every disease going was present. This all goes to show how slow we have been in learning what our neighbors have for us, and the great need there is at the present time for our Federal Government to have some of our expert pathologists and entomologists studying in foreign countries to inform us on what troubles to quarantine and what products to shut out. Representatives of the Department of Agriculture have just learned that the chestnut blight has reached us from China. There for years the disease has been active and destructive on the chestnut. Recently a very destructive nematode (eel worm), which is a most dangerous pest on all trucking crops, has been imported on bulbs from Europe to the Department gardens at Washington. Canada some time ago absolutely quarantined all European potatoes from being imported to the Dominion.

We can not be too alert along the lines of preventing the importation of destructive foreign diseases and insects. Such pests may be doing little harm in their native habitat, owing to resistant varieties, climatic factors, or enemies, but on reaching our country may greatly endanger our staple crops. The cotton boll wevil and the chestnut blight fungus stand as examples.

As you have learned, the Department of Agriculture has extended the quarantine not only against all European potatoes, but also against those from Canada.

Efforts are being put forth by Dr. Orton, of the Bureau of Plant Industry; Dr. Jones, of Wisconsin, and other northern plant pathologists to encourage northern growers of seed potatoes to produce seed of higher grade, freer from disease, and truer to variety. They are hoping to work up a system of State certification of seed, such seed to come within a certain degree of purity with

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regards to variety and disease content. Our Peninsula may be a great factor in furthering this move by demanding the highest quality seed. North Dakota has what is known as the Improved Seed Growers' Association, an organization of farmers and seed growers, who may have their high-grade seed sealed and certified to if the same is found O. K. by the State Seed Commissioner, who is, in this instance, the State Botanist and Plant Pathologist. When northern potato growers can furnish us seed certified to by proper authorities we may expect less loss from black leg and blight or wilt.

LOSSES ON THE PENINSULA FROM BLACK LEG AND WILT DISEASES INTRODUCED IN SEED.

In northern seed potato districts black leg and fusarium wilt are minor troubles and slight stem end infection is overlooked or entirely ignored by seed men. These diseases and others prove exceptionally aggressive and destructive in our latitude. Growers should certainly acquire the habit of stem end inspection of seed, discarding or clipping away all browned areas. This clipping should really be followed by seed treatment. Losses of 15 to 20 per cent have been reported from the black leg disease. It is exceptionally difficult to estimate the loss from fusarium wilt.

SWEET POTATO DISEASES AND THE STORAGE PROBLEM.

Stem blight or wilt, also known as stem rot, is proving very aggressive in some of our best sweet potato lands. We have observed losses this season of 50 to 80 per cent in several fields in the vicinity of Laurel. The disease is manifested in fields by yellowing and wilting of the vines throughout the season. Infected vines are brown internal. Such infected vines produce undersized roots and the crop is materially reduced. The parasitic fungus invades the root at the stem end and is usually more prevalent in seconds or seed material than in the primes. To the layman there is little or no external evidence that roots are carrying infection prior to or while in favorable storage, hence the disease is readily carried from field, through storage, back to the seed bed and again to the field.

The disease is manifested internally of the root by a browning of the vessels under the cambium or skin of the potato. Such infection may be demonstrated by cutting a cross-section at the stem end with a knife. The presence of the disease is plainly evident (here demonstration with infected root was carried out). Such infected seed should not be planted because slips from these will carry infection to the field.

Our estimates indicate that Delaware is lowering its yield in sweet potato 10 per cent (a loss equaling from $40,000 to $45,000 annually) through diseases carried to the seed bed upon or internal of the seed. By internal inspection of seed, by selection, seed treatment, and occasional change of soil in the seed bed much or all of this loss may be avoided.

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The storage problem is one demanding much more thorough investigation. Storage men differ as widely in house management as the houses differ in construction. Data gathered the past two seasons indicate that storage losses average from 20 to 25 per cent, individual houses and lots of roots varying in losses from 2 to 75 or even 80 per cent. In Delaware this storage loss means annually $75,000 to $80,000 or more thrown into the rot pile. Fully one-half of this loss could be avoided by less crowding in storage, by proper top or roof ventilators, and by a more thorough system and knowledge of ventilation. The hygrometer is a useful instrument.

We are looking into the practice common in artificial cold storage systems in which chemicals, calcium chloride, etc., are used in removing moisture. We are anxious to learn whether such method may not be used to partially bridge over critical periods of unfavorable weather. We earnestly ask the co-operation in all these studies of those men interested in storage.

TOMATO DISEASES AND THEIR DISTRIBUTION.

The mosaic disease and wilt have been unusually prevalent the past season. The former disease materially affects the vigor and yield of the plant. Recent studies indicate the probability of this trouble being inherited and carried internal of the seed. We will follow up these investigations. If such is the case again, we should urge upon growers the importance of selecting promising plants from suitable varieties free from disease and the saving of home-grown seed.

The wilt or fusarium wilt of tomatoes, a disease not controllable by spraying, and a more or less persistent soil trouble when once introduced in its most aggressive form has its origin in the seed bed.

High-grade trucking fertilizers are preferable in enriching the seed bed rather than stable manure, which often carries or favors the spread of the disease. Use exceptional care in selecting the areas for seed beds, avoiding, if possible, infected soil. This will mean garden spots, any areas heavily manured, or soil recently planted to tomatoes. A well-rotted clover soil, prepared in fall, when properly fertilized, is ideal for a seed bed.

CROWN ROT OF ALFALFA AND CRIMSON CLOVER.

During the past spring several complaints were received from men in different parts of the State, who were starting alfalfa for the first time, that their stands were severely affected by a crown rot. Examination showed a fungus (Sclerotinia) which is guilty of similar work in Switzerland and other parts of Europe on land where manure had been used.

With new alfalfa stands its appearance is associated with the use of manure. Not only may the stand be affected by a crown rot, but if the first crop is heavy the fungus will develop during damp weather on the stems as a white mold just previous to cutting, affecting at times much of the stand.

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On an experimental acre at the station farm the manured area gave 5 per cent loss by this stem molding.

Crimson clover is affected with the same crown rot on land in which the organic matter is high. During the past season on land at the station farm cropped each year to early potatoes, followed by crimson clover, over 50 per cent of the clover stand was destroyed by this disease. This clover was almost a perfect stand in the early fall.

Professor Fulton, of North Carolina, and Dr. Cook, of New Jersey, reported the disease active in their respective States. Since in starting alfalfa the trouble is associated with the use of manure, this may be obviated by the use of mineral fertilizer and lime. There is indication in the case of the crimson clover loss cited that the disease is carrying over in the soil.

DODDER AND THE NEED OF A PURE SEED LAW.

I have never seen clover fields so badly filled with dodder as were many throughout parts of the Peninsula the past summer. There is an urgent demand for a pure seed law in Delaware. May everyone interested in the advancement of agriculture on the Peninsula stand firmly behind our next Legislature for the support of a good seed law.

YELLOWS AND LITTLE PEACH.

These diseases are losing some of the dread that peach growers once held for them. The former, in States having proper inspection and compulsory destruction, is rapidly being reduced to a minor factor. The little peach, however, is not yielding so satisfactory to similar sanitary precautions. Considerable losses are in evidence from these diseases throughout the Peninsula. With the advent of the new greenhouses at the Delaware Station the Department of Plant Pathology is undertaking investigations upon these obscure diseases. Co-operation is asked from growers. There are many phases of the problem on which knowledge is desired.

CABBAGE YELLOWS AND BLACK LEG.

The yellows of cabbage, a fusarium wilt, and the black leg, another fungous trouble, are two comparatively new diseases causing considerable losses in the cabbage districts throughout the northern part of the Peninsula. There is much promise of resistant strains being developed against these diseases. Dr. Jones, of Wisconsin, has put in two seasons' work along these lines and has some interesting results. He has promised us some of his resistant seed to see if his results will hold upon our sick soils. The work of M. P. Henderson in Wisconsin indicates that the black leg or foot rot of cabbage may be carried with the seed. He found the disease on the stems and seed capsules.

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As the disease prevails in the Long Island cabbage seed producing district, these studies of Henderson's would indicate the wisdom of treating the seed with formaldehyde, using a solution of one ounce in three gallons of water and soaking the seed fifteen to twenty minutes.

FAILURES IN SPRAYING APPLE AND PEACH DISEASES.

Orchardists are inclined to underestimate the value of the dormant spray—that is, the application with the more concentrate solution just prior to the blossoming period; that this application when thoroughly carried out (and it may be done thoroughly both to peach and apple without any injury) has probably the most to do with control of peach scab and curl and also other fruit and foliage troubles of the peach except the late ripe rot, and likewise the scab of the apple, than have later applications. This application, as well as the codling moth application, which, if scab is bad, should also contain the fungicide, should be done with a pressure as high as 200 pounds if possible, and with the use of a Bordeaux or solid stream nozzle, such a one as the Clipper, rather than the hollow stream or vermorel type. However, in the later sprayings on the peach, and possibly also the apple, the hollow stream nozzle is to be preferred. In practice this would necessitate the having on hand the two types of nozzles, the former for the first two sprayings, i. e., the dormant and the codling moth, and the latter for subsequent sprayings on fruit and foliage.

Recent studies on the brown rot or ripe rot of our stone fruits and pomaceous fruits by Matheny, of Clark University, Massachusetts, shows that Sclerotinia cinerea, and not Sclerotinia fructigena, is responsible for these rots in America. This is of interest to us for the reason that recent studies show the fungus responsible for our losses winters over in the mummied fruit, and that the cream-colored spores, so abundant on ripe-rotted peach, plum, and cherry, may remain viable all winter, and likewise the mycelium or vegetative part of the fungus living over in the mummied fruit may, early in the spring, produce a new crop of these conidia spores or cream-colored spores as well as the ascospores. Since this fungus produces blossom and twig blight of peach and appears to be sometimes the cause of failure to set and retain fruit, we should encourage the gathering and destruction of mummied fruit, or the plowing under of the same, and likewise not neglect the spray just prior to blossoming.

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MARKET GARDENING

F. E. MATTHEWS, Pocomoke, Md.

Market gardening is an important subject, especially on this Peninsula, where the natural conditions are such that any person blessed with health, industry, intelligence, and perseverance, and also a natural love for the vocation can undoubtedly make a success in any branch of agriculture, especially in market gardening. With the natural conditions so favorable this pursuit has not as yet in any way reached the importance that it should have assumed ere this time. I do not wish to be misleading, so will say that a person taking up this line of work must be prepared for disappointments, as sudden climatic changes, insects, plant diseases, and often a lack of moisture at the right time are sure to come sometimes. So anyone engaging in this work must be prepared to get in the habit of keeping a stiff upper lip. The soil and climate, generally speaking, are all that could be desired, but occasionally a late frost will blight our prospects, although I do not think this locality any more subject to frosts than any other trucking locality not within the tropics, but it is well to be prepared for them, as many other localities are doing. I regard the water supply as a most important adjunct to this business. Generally speaking, this section is blessed with a plentiful rainfall, but some seasons this much and often needed supply is lacking. This defect can be provided against, as this section is abundantly supplied by fresh water rivers and ponds. Besides there is an inexhaustible supply a few feet below the surface which can easily be obtained by a simple device, namely, the driven well, which, in the event that a surface supply of water is not within easy reach, could easily be made available. These wells can be driven wherever needed, as we do not have to use a divining rod, but, as before stated, we can invariably obtain a plentiful supply in any spot we chose to drive the pipe. Whenever a change is deemed desirable the pipes can easily be pulled and redriven with very little expense except the addition of a new point occasionally. I lay considerable stress on this simple mode of supplying water, as even when a plentiful surface supply is conveniently obtainable this method obviates investments in long lines of pipe and hose, which would make the expense considerable if operations of any great extent were carried on. Perhaps many persons may think I am attaching too much importance to the irrigation question here in this land of generally abundant rainfall, but I do not think so, as my experience has taught me that a ready supply of water at the right time is a most important requirement. In fact, I do not recall a single season in my twenty

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years' experience when a supply of water at just the right time could not have been made to pay many times the interest on the investment, and, in some seasons of high prices, probably the total cost.

The question of suitable soil for this pursuit I think has been settled long ago. Anyone at all conversant with the Eastern Shore (which, I think, should include Delaware, Maryland and Virginia Peninsula) knows that the soil is all that can be required. Do not understand me to say, for I do not mean to be misleading, that every acre will suit for trucking, but trucking soil makes up the great majority of our acreage. It is not all fertile it is true, but can easily and quickly be made to produce paying crops of anything not tropical by the growing of cowpeas, crimson clover, vetch, etc., all of which grow to perfection here, and, when turned under or cut for feed, show good and immediate results. Stable manure from the northern cities can readily be obtained, and for immediate results is a paying proposition, and no doubt when not too costly it is desirable to apply it. I find, however, that crimson clover and vetch sown early, in conjunction with a liberal dressing of high-grade fertilizer, gets there just the same.

In naming the best paying truck crops I unhesitatingly place the growing of early Irish potatoes first. In the first place, it can be grown without the use of hand labor, except at digging time. The seed can be cut by machinery, fertilizer distributed and potatoes evenly planted by the planter. The steel harrow, weeder, and riding cultivator are all that are required to keep the weeds down and properly cultivate the crop. The four or six row sprayer, if wisely used, will attend to the blight and bugs. At maturity the right kind of a digger will lift the crop and place it on top of the soil, making it easy to pick and sort them as they lay. As soon as the crop is off the land is planted in either late potatoes, late cabbage, turnips, corn, etc. Some growers who do not use the digger, but lift their potatoes with the plow, plant corn in every alternate middle, directly after the last working, thus giving this crop a longer time to mature. I think I am safe in saying that I do not know of a single instance where the resulting crop did not give better results than if corn had been planted in the first place, the latter crop getting the benefit of what was left of the high-grade fertilizer used on the potatoes. The usual custom is to sow crimson clover at the last working of the corn, almost always resulting in a splendid catch, this crop also benefiting by the fertilizer that is left by the corn. Also the distance between the rows, from 56 to 60 inches, gives the clover more space than is given in the usual style of planting field corn, and the land is as productive, if not more so, than before, as is proven by the yearly increase in crops on land where this rotation is practiced. I expect these statements sound rather strong, reminding one of the man who started the cat and rat farm, when the cats ate up the rats and rats ate up the cats, etc., but I assure you my statements are true. If late cabbage, turnips, etc., are planted instead of corn, crimson clover is sown in the growing crop. If late potatoes are selected to follow the early potatoes, rye and vetch are sown after the crop is dug, as the advanced season makes

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it risky to sow crimson clover at that time; or timothy can be seeded instead of rye and vetch if preferred. This crop can be cut for hay the following season, usually resulting in a fine crop. The Irish Cobbler is the variety almost exclusively grown here. The seed stock is either brought here from Maine or raised locally, with potatoes kept in cold storage through the summer and planted during July or the first of August. My preference is for our locally grown seed for several reasons. First, because if there are any mixed varieties planted with the Cobblers, and this is quite often the case, they can be detected by the different appearance of the tops and removed, leaving the seed straight. This, I think, is a most important matter, as I had about as leave have missing hills as to have other varieties mixed in with Cobblers. This variety matures earlier here than any other that I know of, and as most growers dig as soon as the crop is ready, the mixed variety at this time is generally in the cull class, and I do not find it profitable to ship culls. These home-grown potatoes I think are generally freer from disease than the northern grown. They are also more economical, as a barrel will plant much more ground than the northern grown seed, for they do not run so large and are of a more even size, and this is quite an item when seed potatoes are high.

The growing of sweet potatoes is found profitable also, particularly where the soil is light or sandy. The most popular varieties are the Big Stem and Little Stem Jersey. I think this a more expensive crop to grow than the Irish potato, as it entails quite an expense to provide glass, heat, water, etc., besides it costs me more to cultivate, as I find it risky to use a weeder. The plants can be set by a two-horse transplanter, but can not be set in hills, consequently as the crop can not be worked each way, and with me that means the hoe, which is expensive. Besides, this crop occupies the ground the whole season, and this is expensive also. Many persons who are fully, if not more capable of judging conditions than myself, do not agree with me in this matter, but this is my view of it.

The growing of early cabbage and lettuce is quite profitable, as this section fills in the gap between the Norfolk and Jersey trucking sections.

The growing of melons, cantaloupes, cucumbers, etc., pays well in some sections of this Peninsula, as their flavor is as fine as can be produced anywhere. I am referring to watermelons and cantaloupes, as of course everyone knows a cucumber has no such quality until it is converted into a pickle, and you don't have to come to the Eastern Shore to do that, and, as I have stated before I do not wish to exaggerate, I make this correction.

The early tomato is a paying crop. I know of sections here where it is the chief money crop, and it must live up to its reputation, as I do not know of more prosperous sections anywhere than the sections where this crop is king.

I might keep on down the line of all the vegetables grown in temperate climes in the same strain, but will not weary you longer. I will add a word or two, however, in reference to the strawberry, which I think should be included in every market gardener's list of crops. This is to me a most fasci-

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nating crop, as the almost endless list of varieties will keep inducing a grower to keep on planting, in the hope of getting the perfect variety at last. The financial part of the matter also has its fascinations, for if the early tomato is king in some sections, the strawberry is no doubt queen in all, as this beautiful and luscious fruit is almost universally grown, and I may say to perfection. I think most of the city dwellers will inform you that their first real fine strawberries of the season come from this Peninsula.

Some one may ask as to markets. We are connected with all the great ones to the north, east, west, and south of us, both by rail and by water routes, as fast steamers ply up easy navigable rivers. It is true that we have only one line of railroad, and I think it might give us better service and cheaper rates. Conditions have been gradually improving of late, however, especially in the way of better service, as I am informed that this line will soon have double tracks clear through the Peninsula. No doubt their maxim is one thing at a time, and we hope the decrease in rates will come in next time.

In conclusion will say that I honestly think that anyone with intelligence and industry will have little trouble in succeeding here in almost any agricultural pursuit. but mv choice would be my subject, Market Gardening.

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WHITE POTATOES

E. H. SHALLCROSS, McDonough, Del.

In making a report on this important crop of the Peninsula it would probably be well to consider first the past year's crop in reference to profits and production, and while it probably would be out of place to take up in detail the methods used in growing this crop, yet the writer feels some space should be given to this side of the question and is going to ask the audience to pardon the personal references.

The yield on the Peninsula the past year, from the data I have been able to gather, was about 85 per cent of a normal crop. The prices realized were probably a little above normal, ranging from 60 to 80 cents per bushel net at the station; the quality was good and the buyers were in sufficient number to keep the stock well cleaned up.

The prospects are that an increase in acreage will be planted this year. The farmers of New Castle County are just beginning to realize the possibilities of the white potato crop when properly managed.

Potatoes, like other crops, have their place in rotation and do best when the rotation is such as to have an abundance of humas to work in the soil. A red clover sod or a good growth of scarlet clover thoroughly cut up with a cutaway harrow run both ways and then plowed from 7 inches to 9 inches deep and worked down to a good seed bed makes a promising condition to begin with.

The selection of seed is one that requires the good judgment of an experienced grower or the advice of a trained expert. The seed potato question is getting to be a serious problem, as our seed growing sections are getting so infested with diseases of all kinds that perfect seed is almost out of the question at the present day.

Cutting the tubers is more important than most appreciate—that is, the size of the pieces. The following table will illustrate this. The seed were planted 12 inches apart in the row and 2½ feet between rows, season of 1911.

TABLE I.

No. of Exp.	Size of Plat Acres	Bu. Seed per Acre	Yield Bu. per Acre
1	.25	14	105.0
2	.41	16	121.3
3	3.28	21	127.0
4	.30	24	127.0

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By an examination of Table I it will be seen that cutting the seed potatoes as in experiment No. 2, using 16 bushels per acre, is the most economical. All other treatments of the plant were identical.

I had always planted 14 inches apart in the row up to this time and changed to 12 inches because of the following results:

TABLE II.

No. of Exp.	Size of Plat Acres	Dist. Seed Apart in Row	Bu. Seed per Acre	Yield Bu. per Acre
1	.28	14	12	91.0
2	.25	12	14	105.0
3	.91	14	19	106.7
4	3.28	12	21	127.0

Table II shows 12 inches apart in the row will outyield 14 inches—that is, increasing the number of hills does not place them so close as to affect the size of the hills.

The choosing of a fertilizer is another very important factor. In this section—that is, New Castle County—we use principally a 4–8–10. I have used a number of different ready mixed goods and mixed my phosphate for my entire crop at times. After several years' experimenting and noting results and phosphates the following mixture was evolved for my 1913 crop, which phosphate was made especially by a fertilizer manufacturer. The mixture is as follows:

TABLE III.

Quantity lbs.	Ingredients	Ammo. %	Phos. Acid %	Potash %
350	10 % Fish.	1.92	.70	....
110	16 % Blood.	.91	...	....
60	24 % Sulph. Am.	75	...	....
50	50 % Calcium Cyanamid.	.48	...	....
960	14 % Acid Phos.	...	7.30	....
395	50 % Muriate Pot.	...	...	10.08
75	Sand.	...	...	....
2,000		4.06	8.00	10.08

This mixture gave the best results of any fertilizer I ever used and I will hold to this formula for the present.

The quantity of fertilizer to use per acre of course should be governed to some extent by the fertility of the soil. In 1912 I made several experiments with different kinds of fertilizer and different quantities. Two of these experiments are given below:

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TABLE IV.

No. of Exp.	Size of Plat Acres	Lbs. of Fert. per Acre	Yield Bu. per Acre	Gain Bu. per Acre
1	.50	1000	137	57
	.50	1500	194	
2	.50	1000	92	50
	.50	1500	142	

The first fertilizer shows a gain of 57 bushels for 500 pounds of fertilizer and the second a gain of 50 bushels for 500 pounds of fertilizer. Both of these fertilizers were 4–8–10 but compounded differently. The yield of potatoes per acre in the first case shows the superiority of that fertilizer. Up to this time I had always used 1,000 pounds per acre. After this experiment I used 1,500 pounds per acre and I believe with paying results.

The variety to be planted depends upon locality and soil conditions. The Cobbler is a favorite in this section and has given the continued best results. I planted a number of varieties last year in co-operation with the Delaware Experiment Station. Some of the results are given below:

	Variety.	Corrected yield of merchantable tubers in bushels per acre.	Corrected total yield in bushels per acre.
1	White Bliss	309	351
2	Good News	302	343
3	King of Roses	300	350
4	Cobbler	300	344
5	Peck's Early	283	324
6	Bovee	281	326
7	Rehoboth	278	330
8	Roseling	278	346
9	Quick Crop	275	326
10	King of Earlies	273	329
11	Early White Victor	272	306
12	Eureka	270	300
13	Swiftsure	260	308
14	Early Six Weeks	250	299
15	Potentate	240	291
16	Ohio Junior	237	308
17	Crown Jewel	229	274
18	Vicks Perfection	226	282
19	Star of the East	216	276
20	Clyde	212	241
21	Ohio	202	237

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It will be seen that Cobbler stands fourth on the list, but the difference is very slight, and I will say the White Bliss could not be detected from the Cobbler. The Good News and King of Roses are red potatoes and are not popular salable potatoes. The fertilizer was the same on all plots, 1,500 pounds per acre of the formula given in this report.

I might say just a word in reference to my present methods of tilling. I have already spoken of the preparation of the seed bed. I plant rows 2½ feet apart, and plant potatoes 12 inches apart in the row to a depth of 4 inches.

I start cultivation from five to seven days after potatoes are planted, using first a two-horse wheel cultivator, setting the inside teeth that go next to the potatoes about 5 inches apart, and run them in the ground deep enough to go down besides the piece of potato and break that ground that is packed by the shoe of the planter, as this cultivation is the only time I can get so close to the potato. I harrow with a drag harrow twice before the potatoes are up, and then plan on getting over once or twice with a weeder while they are coming through, before they are large enough to cultivate. I start cultivating as soon as they are large enough and plan on getting over them once every week until within four weeks of the time I start digging. Thorough cultivation and the keeping of a dust mulch are important factors. I use a one-horse cultivator the last two or three cultivations and hill them up the last cultivation.

I spray usually about three times, beginning when the vines are from 6 inches to 8 inches high, and then every two or three weeks. I have used a number of spray materials and poisons for the potato bug, but I think I got the best results with atomic sulphur for the fungicide and arsenite of zinc for the insecticide.

I got a yield of 195 bushels of potatoes per acre on 46 acres, by far the best crop I have ever grown, and the season was not an exceptionally good one for potatoes.

To grow potatoes successfully one must be thorough in all operations from the beginning to the end.

WHITE POTATOES IN WORCESTER COUNTY

F. J. DUKES, Girdletree.

The white potato in this section is one of the leading crops, and is becoming more and more extensive each year. Our early crop is planted from March 10 to March 25. Home-grown and northern seed of the Cobbler variety is used. There is a general preference for the home-grown seed because the general run of the size is more uniform. This decreases the expense of planting. They

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also produce a larger yield of uniform, marketable potatoes. Again, the farmers in this locality find it much more difficult to get a stand where northern seed is planted. The only advantage in using the northern seed is that it will mature from ten days to two weeks earlier. The planting is done largely by machine, drilling in a commercial fertilizer, usually 7–6–5 at the rate of twelve to fourteen hundred pounds per acre.

We were troubled with the flea beetle and the Colorado beetle. All level, stiff soil was attacked with early blight, which resulted in cutting the crop to about one-half average yield this year. The prices ranged from $1.80 to $2.50 per barrel, f. o. b. shipping point. Scarcely any of the crop was consigned to the northern markets, it being found that the exchange gave better prices.

The late crop is planted from July 10 to 15, generally following a crop of crimson clover. This form of crop rotation works very well. Green Mountain, Hoosier, McCormick, and Rehoboth are the principal varieties grown. Green Mountain makes from fair to good crop, Hoosier poor to fair, McCormick fair to good, and Rehoboth fair to good. The crop was harvested in good condition. Scarcely any of it was marketed at harvest time. The price ranged from 45 cents to 60 cents per bushel in bulk, f. o. b. shipping point.

REPORT ON SWEET POTATO CULTURE

E. F. LECATES, Delmar, Delaware.

The sweet potato industry on the Peninsula has undergone great development in the last ten years. In Sussex County, Delaware, and Wicomico County, Maryland, it has grown until it is an industry of first importance. Around Laurel and Delmar, Delaware, it is perhaps the biggest crop grown. It amounts to hundreds of thousands of hampers annually, and brings in a great many thousands of dollars each year. The value of the crop for the year 1912 in and around Laurel and Delmar, Delaware, approximated one-quarter of a million dollars. A great many other shipping points are almost as large. You can readily see that it is a very important crop and it is a very important factor in the material welfare of the Peninsula. It not only adds to the material prosperity of the producer, but also supplies an economical food product to millions of consumers.

The production of the sweet potato presents no great difficulties. Yet there are problems connected with its preservation and marketing that are very difficult to deal with, partly from the fact that they are not understood.

The varieties most commonly used in Delaware and Maryland for market sweets are "Up River," "Big Leaf," "Big Stem Jersey," "Improved Big Stem

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Jersey," and "Gold Skin." These are all yellow varieties and some of them are very nearly alike, especially "Up River," "Big Leaf," and "Improved Big Stem Jersey." The "Gold Skin" is a distinct variety, and is very much liked by some growers on account of its good shape and color. It is not considered, however, as good a keeper for late marketing as some of the other varieties. There are other varieties that are sometimes grown for home use, but are not grown to any great extent for marketing purposes, such as "Southern Queen," "Hayman," "Red Nansamond," and "Nancy Hall."

To have success as a sweet potato grower it is necessary to begin making preparations almost one year ahead. Experience seems to prove that the sweet potato plant itself has an important bearing on the final result. If strong, vigorous, disease-free plants are used, a long step has been taken toward final success. The experience of most growers indicates that it is best to use plants that have been started from what are commonly called "slips." Slips are potatoes that have been grown from a portion of vine the preceding year. In growing these slips it is advisable to grow them from healthy vines, and in order to determine this fact some of our most successful growers think it advisable to pull the whole plant up to satisfy yourself that there are no indications of disease. Finding it free from disease and in a strong, healthy condition, you can then use the whole plant for slip growing. I can not emphasize the importance of good, clean, disease-free seed too strongly, for with these you may fail, and without them you are almost sure to fail.

There are two methods of starting the plants. One is the manure bed, the other is the fire bed. The particular kind of bed you use is not so important as the care you exercise in making the bed and the kind of soil you use in the bed. Be careful not to bed too thickly, as this causes the sprouts to be slender and weak. It is my experience that the first drawing of plants from the bed are the best ones. I would rather pay a good fair price for first drawings than to have the second or third drawings given to me. It is obviously important to make preparations for as many plants at first drawing as you are going to need. It will pay to do so.

I have seen farmers make their potato beds in precisely the same place where the old ones were, using the same soil that was removed from the old ones to make and cover the new ones. This would probably do no harm if one were absolutely sure that the old bed had no disease or left no infection therein. If you use the old bed, it is best to remove all of the old soil. Use new and clean sand in making the new one.

Sweet potatoes are grown in almost any and all kinds of soil, but to grow them as they should be requires a light, sandy soil. It makes very little difference whether the soil is rich or poor, provided the proper fertilizer is provided. The cleaner the sand in which they are grown the more beautiful will be the potatoes and the more likely they are to be free from disease. Soils that a very few years ago were considered almost worthless because

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they were so poor and sandy are now prized very highly for sweet potato growing.

In preparing the soil for planting you should prepare it as for almost any other truck crop, with the exception that it should be plowed shallow, not more than 2 or 3 inches deep. This has a tendency to make the potatoes short and chunky, as the present day market demands. After plowing the soil should be thoroughly pulverized or harrowed. If the soil has been plowed in the spring and kept thoroughly harrowed until time of setting plants, you will generally have less trouble in getting a stand of plants, as the soil will then be in fine mechanical condition, free from grass, and with an abundance of moisture. In the matter of fertilization much will depend upon the previous condition and treatment of the soil. If the soil is already in a fair state of fertility, good crops of sweets can be grown with less commercial fertilizer than where it is very poor. Barnyard manures are of doubtful value in sweet potato growing, not possibly from the standpoint of yield, but from the standpoint of quality and appearance. It has been fully demonstrated that sweet potatoes can be successfully grown on almost any sandy soil, free from disease, no matter how poor it is, with commercial fertilizer alone. It is not only more economical, but you are surer of growing potatoes that are freer from disease and have a better appearance.

As to the exact kind of fertilizer for sweet potatoes there exists much difference of opinion. Here again much would depend on the previous condition and treatment of the soil. For instance, if I were following cowpeas with sweet potatoes,I would use a fertilizer with less nitrogen than if I were following corn. There seems to be an opinion among a great many growers that it requires a heavy application of potash to grow sweet potatoes. I am not sure that this opinion is well founded. I have noticed no difference either in yield or quality from the application of a fertilizer carrying 7 per cent potash and one carrying 10 per cent potash. There also exists a difference of opinion as to the source of the potash used in fertilizers for sweet potatoes. some growers claim sulphate superior to muriate of potash, not in yield, but in quality and appearance, and that the plants after being set will live better where sulphate is used than where muriate is used. I have observed no difference.

What seems to have been a proper formula with a great many growers is a 3–8–10 goods. A fertilizer carrying 3 per cent ammonia, 8 per cent phosphoric acid, and 10 per cent potash can be gotten from the following ingredients: 600 pounds dried fish or concentrated tankage, 1,000 pounds of 16 per cent acid phosphate, and 400 pounds either muriate or sulphate of potash. I have found this a very satisfactory formula, and for the majority of soils this would make a very good fertilizer for sweet potatoes.

The method of application will in a measure determine the quantity to be applied. If the fertilizer is applied broadcast, a heavier application can be made without danger of injuring the plants than when all is used in the drill. A great many growers are now using their fertilizer broadcast. Others

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are using it in the drill, while still others are using it both broadcast and in the drill. When used both ways applications of 1,000 pounds broadcast and 600 pounds in the drill should prove a proper application. When it is all used broadcast a heavier application can be made with safety. If it is all used in the drill, a lighter application would be preferred.

If you have started your plants as previously stated and you have prepared and fertilized your soil, you should be ready to set your plants by the middle of May. There are three methods of setting the plants—hand method, hand transplanter method, and machine method, where the plants are set by a horse-drawn transplanter. The last method is probably the best method where large areas are to be set. Although large areas are sometimes set by the hand transplanter, I prefer the horse-drawn transplanter because it sets the plants practically level and in an even, straight row, which permits the early cultivation to be close, and does away with the need of much hand hoeing. Under most conditions I would water the plants. Plants set in dry weather and watered will start earlier and do better, if cultivation is prompt, than plants set in wet weather and not watered.

Cultivation should start as soon as the plants are set, and if there has been thorough preparations before setting and prompt cultivation afterwards, very little hand weeding will be required. Some growers do no weeding except what they do with the horse weeders and hand wheel weeders. Level culture, or nearly level culture is preferred to the old extreme hilling method, as it has the tendency to cause the potatoes to grow short and more chunky. Cultivation should be often enough to keep the soil in fine mechanical condition and to prevent the grass and weeds from getting a start until the vines have got a start. If this is done, the vines will generally smother out any foul growth that may start afterwards. In most seasons five or six harrowings after the plants are set will be sufficient.

Digging may be begun any time after the potatoes are large enough to use or market. This is advisable only when they can be marketed at a price sufficient to justify digging before they are fully matured. When they are to be stored for future use or marketing it is not advisable to dig until they are practically matured, as a few days' growth sometimes makes quite a difference in the total yield. Ten days or two weeks' growth has sometimes made as much as 25 per cent increase in the total yield.

If possible, they should be dug in dry, sunshiny weather, as the earth will then readily fall from them, causing them to have a much better appearance than if dug in damp weather, and it will also increase the keeping qualities. A great many of the growers are now using a specially constructed sweet potato digger and are finding it very satisfactory. They should be handled with as much care as possible, as cuts and bruises injure their appearance and may cause them to be more readily affected by disease.

Success in keeping sweet potatoes that are stored will depend in a large measure on the condition in which they are put in the house; also on the house itself, its temperature and ventilation. They should be put in the house

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in as dry and perfect a condition as possible. The house itself should be dry and means should be provided for keeping it at the right temperature and with proper ventilation. As to the proper temperature at which they should be started and kept there exists a difference of opinion. Some of the storers claim they should be started at a high temperature of 75 or 80 degrees, and kept at a high temperature until thoroughly dried out, when the temperature should be brought down to around 60 degrees and kept there afterwards. There are others who believe that high temperatures are conducive to the development of some of the most disastrous diseases that affect sweet potatoes.

Proper ventilation is almost as important as proper temperature, and in storing houses means should be provided for proper ventilation. Ventilator shafts placed in the middle of large bins would be a benefit, as more decayed potatoes are generally found in the middle of the bins than elsewhere.

What is commonly known as Black Rot has caused more injury to the sweet potato industry than all other causes combined. The loss from other causes is comparatively small. Most sweet potato growers have had some experience with this disease, but very few of them know anything about it so far as a preventive or remedy is concerned. There are some facts connected with the storing of the 1913 crop that seems to prove that high temperatures aid the development and growth of Black Rot. The fall and winter has been comparatively a warm one. It has been easy to maintain high temperatures in the storing houses. The loss from Black Rot has been greater than in an average season. The crop around Delmar and Laurel, Delaware, was a very large one, so large that the regular storing houses would not hold the crop, and a great many had to put them in barns and other outbuildings, where no artificial heat could be applied. In almost every instance these potatoes that were kept without the use of artificial heat have not been affected so badly by the Black Rot. This fact indicates to me that high temperatures aid the development of Black Rot. Generally speaking, however, nobody knows very much about it. Our agriculture experts and experiment stations have not yet offered much relief. If they know very much about a preventive for Black Rot, they are hoarding their knowledge.

There are other diseases and rots which affect sweet potatoes, such as Ring Rot and Mush Rot, but the loss from these rots is not near so great as from Black Rot. There is also a disease called Black Shank or Black Stem that sometimes does a great deal of damage to the plants themselves.

In marketing sweet potatoes quality and appearance count as much as in marketing any other product. The package most commonly used to market the Delaware and Maryland kiln-dried sweets is the bushel hamper. The Eastern Shore of Virginia sweet potato growers generally use the barrel. No matter what the package care should be used in packing. Potatoes that are too large or too small should be packed as No. 2's, if marketed at all. Potatoes that show decay from any cause should not be put in. Packages should be well filled and finished to give a good appearance on opening, but not a

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deceptive appearance. A package should not show to be something that it is not.

Under ordinary conditions there are fair profits in sweet potatoes. A normal yield per acre when treated as has been indicated would be around 400 five-eighths baskets of No. 1's, and probably 50 baskets of No. 2's, which are generally marketed for canning purposes. I wish to state here that the canning of sweet potatoes has helped the sweet potato industry, since a lot of small potatoes that were formerly almost worthless can now be marketed, and, since the cost of production is no more, it adds to the net proceeds. Some growers realize enough from their No. 2's to pay for harvesting their whole crop.

Allowing 25 cents per basket for No. 1's and 10 cents per basket for No. 2's, the gross receipts of a normal acre of potatoes would be $105. The cost of producing an acre, allowing the use of four-fifths of a ton of fertilizer such as has been described in this article, would probably not exceed $50, leaving a net profit of $55 per acre.

(a) Plants grown from what are commonly called slips are stronger plants than when grown from the small potatoes. (b) Slips should be grown from vines that are absolutely healthy and free from disease. (c) The first drawing of plants is stronger and more vigorous than any other drawing from the same bed. (d) Great care should be used in the starting beds to have them free from diesease. (e) A light, sandy soil is required for sweet potatoes to reach their best as to appearance and quality. (f) Plowing should be shallow and harrowing thorough. (g) Sweet potatoes seem to require relatively large quantities of potash. (h) In large areas machine transplanting is more economical than hand transplanting. (i) Cultivation should be prompt and thorough. (j) Great care should be used in handling the potatoes when digging. (k) Proper temperature and ventilation should be provided for the dry kilns. (l) Black Rot causes more loss to sweet potato growers than all other causes combined. (m) No one has yet discovered a practical and effective preventive or remedy for Black Rot. (n) High temperatures seem to aid the rapid development of Black Rot. (o) Use every known precaution, from the growing of your slips to the marketing of the potatoes, to prevent Black Rot, and expect to fail a part of the time. (p) In marketing sweet potatoes quality and appearance counts as much as in marketing any other product. (q) There are no established rules in sweet potato culture that somebody's experience does not contradict.

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REPORT OF COMMITTEE ON FERTILIZERS

Dr. H. J. PATTERSON, Director Maryland Experiment Station.

It is not my purpose to make an extended report on fertilizers, but merely to call your attention to one or two things that may not be familiar to you. The first is in reference to the term phosphorus. Phosphorus and phosphoric acid, when referring to plant food, are one and the same thing. This element is derived from bone and from phosphate rock. In Maryland we have used it for many years and have fallen into the habit of calling it phosphoric acid. In the West they call it phosphorus, but the term is synonymous with phosphoric acid. There is one phase of the fertilizer question which has not been discussed at length, and that is the question of the sources of nitrogen. There are a good many sources of nitrogen used in fertilizers. Farmers should aim to grow their nitrogen from leguminous crops, but many of them are not doing it to the fullest extent, and they have to resort to the commercial forms. In work that has been done at some of the experiment stations the relative value of the different sources of nitrogen has been learned. The farmer should know whether he should use nitrate of soda, sulphate of ammonia, dried blood, or some other material as the source of his nitrogen. There is another substance coming into use in our mixed fertilizers. It is known as calcium cyanimid, which is made by combining lime with the nitrogen of the atmosphere. Farmers should be thinking about this matter and find out whether the nitrogen from this new source is as valuable as nitrogen from other sources. In any event, they should know the source from which the nitrogen is derived when they buy it in commercial fertilizers. It is particularly important for the purchaser of mixed goods to know that he is getting what he wants to obtain.

Mr. Barker—How may we know what kind of nitrogenous material the manufacturer uses when he makes up his fertilizers?

Dr. Patterson—The chemist can tell to some extent, but it is more or less difficult. This brings us back to the question whether the farmer should buy the ingredients separately and mix them himself, in which case he can mix them in reference to the soil in which the crop will grow, and also in reference to the needs of the crop, or whether he shall buy ready-mixed fertilizers. I strongly advise farmers to buy the materials and mix them. I think we should encourage the use of sulphate of ammonia, and we should encourage coke manufacturers to save all the sulphate of ammonia possible. It is stated that $22,000,000 in by-products of the coke works go to waste annually. This

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could all be saved, and it would reduce the cost of nitrogen if all of the sulphate of ammonia were saved at the coke works.

Mr. Shallcross—Do you advise the use of undissolved South Carolina rock?

Dr. Patterson—Under some circumstances it would pay to use the undissolved rock. You get about twice the amount of phosporus per ton that you get in acid phosphate, but this phosphorus is only slowly available. Where the soil consists of a pretty heavy clay, and has an abundance of vegetable matter decomposing in it, it is safe to use the undissolved rock or floats. Some of the first work that was ever done to determine the value of this material was done at the Maryland Experiment Station. The work in Illinois and Ohio followed that in Maryland and they used the results that we secured as the foundation for their work. I would not use undissolved rock except in soils that are heavy and filled with humus or for the slower growing crops. The undissolved rock should give satisfactory results for orchards. For quick-growing truck and market garden crops better results would probably be gotten by the use of dissolved phosphates.

SOIL PROBLEMS FOR FRUIT GROWERS

Dr. JACOB G. LIPMAN, Director of New Jersey Experiment Station.

We all realize that the big question in agriculture is the water question. Our crop yields of this year illustrate this fact as well as any example I might choose to give you. The corn crop of this country was 250,000,000 bushels less than a normal crop. Kansas, Missouri, Iowa, and Illinois suffered greatly because of the lack of rainfall. Taking the country over, the water supply is the biggest factor in soil fertilization. The water question is one of direct importance and too much can not be said about a correct knowledge of the principles that underlie the sources and use of our water supply. The rainfall in this part of the country is about 4 inches per month or, roughly, 50 inches per year. It takes 3 inches of water to produce a ton of dry matter and only half of the water is available for growing crops. In other words, it takes 6 inches of rainfall to produce a ton of dry matter, and for some crops we therefore need a summer rainfall of 8, or 12, or 15 inches. From the standpoint of the fruit grower, the water question resolves itself into three groups of facts which we should study carefully. We do not pay the attention we should to securing a maximum proportion of the rain that does fall on our land. A great deal of it runs off the surface. We do not provide the conditions in our orchard for storing up of the rainfall. There are several practical methods that are available for aiding us to save this rainfall. The main

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things are tillage humus, and lime. It is not merely a question of catching the rain that falls, but of holding it. During the growing of a corn crop, an average period of one hundred and twenty days, there is an average rainfall of 4 inches per month, or 16 inches during the time the corn is growing. Only one-half of this rainfall is available leaving 8 inches which runs off or drains away and never becomes available for the corn. It takes 3 inches of rainfall to produce one ton of dry matter. In other words, we need 9 to 12 inches of water to produce a crop of corn amounting to 50 bushels per acre. So it is necessary to store up in the soil a portion of the water that fell during the winter and spring, and if we do not have this amount we are not able to produce a maximum crop. We are at fault in not storing up the moisture that we have. It is true that there are some dry years which are lean years and we must trust that to the Lord. At the same time we realize more and more that there are things that we can control. We can not control the winds or rain or temperature, but we can control the conservation of the rainfall and we can control the temperature in a measure. We can control the soil climate by controlling the moisture. Unless we stop and give due heed to this problem we are not likely to make the best use of the plant food which becomes available in the soil or is supplied from outside sources. As a practical problem, What can we do to enable us to make the best use of the rainfall that comes? How can we increase the water-holding power of the soil, and how can we conserve the moisture in the soil to obtain a larger crop? I can not refrain from saying something about the great importance of studying the relation of the vegetable matter in the soil to crop production. I feel particularly interested in this phase of soil fertility. For instance, in the northern part of New Jersey there is twice as much plant food in the soil as there is in the soil of southern New Jersey, and yet in the south the farmers are raising twice as much shelled corn per acre as they are raising in the north. So it is not only the quantity, but the quality, of the plant food in the soil that must be considered. There is an intimate relation between the quantity of humus in the soil and the quantity of moisture that the soil will hold. One hundred pounds of sand will hold about 25 pounds of water. One hundred pounds of clay will hold 50 pounds of water. One hundred pounds of dry decaying matter will hold 190 pounds of water. I simply give this list to show the great importance of vegetable matter in cultivated lands. The very sandy soils of Europe, in Belgium, Holland, and North Germany, were, to all intents and purposes, barren, and were believed to be barren because they were nothing but coarse, shifting sand. These sands were barren until the owners realized that vegetable matter could be stored in them, and with this vegetable matter moisture and plant food could be retained until used by growing crops. The soils of portions of Maryland and Delaware are light, sandy soils, and you know by experience that you get excellent results by plowing under crimson clover, vetch, soy beans, cowpeas, and other vegetation. But in these soils and in this climate it is difficult to maintain a large quantity of decaying vegetable matter in the land. It burns out rapidly. The

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condition of these soils is practically opposite to that of heavy clay lands, where the vegetable matter does not decay fast enough. Sandy soils are over-ventilated. We should therefore get the vegetable matter far enough down into the soil so that the air does not reach it quite so fast and quite so well, and then it can not burn out quite so rapidly. Light soils are improved when they are cultivated deeply and all the cultivated soil is well filled with decaying vegetable matter. We have methods of doing this cheaply. We have deep tilling machines. By doing these things, that is by deepening the soil and filling it with vegetable matter, we solve the question of soil moisture. You realize that unless we have plenty of moisture in the soil the plant food does not become soluble. Sufficient soil moisture is the basis of soil fertility and we can not overlook this fact.

I wish that I could put more emphasis than I can on the very grave importance of considering the water supply before we begin to consider the plant food problems. You know that even though we spray our orchards and control insect pests and plant diseases, and though we have selected our trees with care and pruned and tilled and fertilized them, we have years when the production of fruit is small because of the lack of the necessary rainfall. We have large crops when rainfall is ample. The difference is due to the difference in rainfall. When the rain is abundant the crop is large. So we come back at every turn to this question of soil moisture. Plant food must be dissolved. I repeat, that before we try to store plant food in the soil we must provide the moisture. The useful bacteria so necessary to a fertile soil live only where there is moisture. We can not get away from the fact that plants are built of certain materials, just as a house is built of materials, and if the soil does not contain the materials that are necessary to make it fertile, then we must supply these needed materials. If we have no phosphorus, we can not build a productive soil. So we must supply whatever is necessary.

I am impressed very much as I study fertilizers and our farm practice, and compare our conditions with those of Europe, that their crop yields are larger than ours and that the amount of fertilizer that they use is smaller than ours. In New Jersey we use for some crops 1,500 pounds of a 4–8–10 fertilizer per acre. They do not use any such amount abroad, but they have more than twice our production. The American farmer thinks that the use of fertilizer can take the place of tillage. I do not advise tillage as a substitute for all fertilizers, but we should find out very clearly just what our soils lack. We should make an inventory of what they contain, and whether we can draw from them the supplies of plant food that are needed for our crops. The soils of Pennsylvania, New Jersey, and New York contain from one-half per cent to 2 per cent of potash. If we could draw at will upon this source of supply, we should not have to buy potash. Some experiments that have been made in New York and New England and in Pennsylvania by Stewart have shown that in some cases potash failed to increase the yield of certain crops. In other cases it gave an increase, sometimes large and sometimes small. The Geneva Station shows that in some of the apple orchards in New York

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commercial fertilizers did not increase the crop yield. In some cases phosphoric acid failed to benefit crops; in others it gave a big increase. When we stop to consider that water is the limiting factor, we understand why the use of fertilizer often fails to bring an increase. If we have an ample supply of moisture, the supply of plant food is the factor that regulates the yield. We are not certain what our soils lack, and so are not certain what kind of plant food would enable us to increase the crop. Usually in light soils there is not much potash. In soils where potash is present in large amounts we can unlock it by supplying vegetable matter. Vegetable matter in the soil is in a state of constant change, and by its decay and fermentation it causes the soil particles to dissolve slowly; hence, if vegetable matter is present in large amounts it is questionable whether we need to apply potash. If not enough of the plant food in the soil can be made soluble or available to the plants, then we must supply this plant food from outside sources. This much we can assume: If we make proper provision for adding to the soil sufficient quantities of vegetable matter, and if the soil is naturally heavy, it is questionable whether it will pay to apply potash. If the soil is of a medium character, you will usually find that the application of potash pays. Some seven or eight years ago we established a peach orchard in Vineland where the land was so poor that it would not produce any merchantable corn. A year after the orchard was set out I made a visit to it in company with Professor Blake, and we found that the trees were making a good wood growth. If we had applied nitrogen at this time, the trees would soon have made too much wood growth. Young peach trees seem to be able to secure all the nitrogen they need from legumes that may be grown in the orchard and worked into the soil. But a few years later, after these trees came into bearing, we found that it was very profitable to apply nitrate of soda or nitrogen from some other outside source. When we used from 50 pounds to 150 pounds of nitrate of soda per acre to this bearing orchard, we got excellent results. If we could have continued to grow vetch and crimson clover abundantly in this orchard during the bearing years, it probably would not have been necessary to apply the nitrate of soda, but with the trees close together, so that the ground was shaded, and with the growth of these legumes excluded, we had to depend upon nitrogen from outside sources. There are always one or more limiting factors in the production of crops. It may be moisture, or plant food, or some other factor. If plant food, it may be a single substance, such as nitrogen, potassium, or phosphorus. We remove one of these limitations by supplying the necessary thing that was lacking and another limiting factor appears. The application of plant food can not be made in accordance with any one formula, or any general formula. We have to know the needs of our trees or our crops and the condition of our soils in order to supply those needs economically. As trees grow in the orchard and bear fruit we have to apply larger amounts of plant food. When we have an abundance of moisture we may apply nitrogen to produce a rank growth ,and this makes it necessary for the tree to have more potash and more phosphoric acid, and if the soil does not

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contain enough of these things we must supply the lack by applying muriate or sulphate of potash, and acid phosphate, or basic slag. In some cases the application of lime will release potash, so that lime and basic slag may supply all that is needed. In a ten-year-old apple orchard in northern New Jersey the owner has been using limestone and basic slag, and finds that the trees are no longer making vigorous growth. That soil is rich in potash but deficient in nitrogen. Another fruit grower, prominent in our own State, does not believe that his orchards need any legumes and thinks that basic slag is the only fertilizer that he needs to apply. After ceasing the cultivation of his orchard in the summer he allows the weeds to grow. But this man soon got to the point where his crop began to go down. We must recognize the fact that the soil is the source of much plant food, but we can not expect it to furnish all that is needed and we can not expect any particular formula to apply to all crops and to all conditions. We must know soils and climatic conditions, and when these are understood the orchardist can determine what will pay and what will not pay. If he lacks nitrogen, he can soon determine whether he should depend upon cover crops or should apply nitrogen from some other source. If his trees show that his legumes are not giving the trees enough nitrogen, he should apply an additional amount in nitrate of soda or in some other form. But if the set of fruit is poor, it may not be worth while to apply nitrogen; it may not be needed.

The practice must vary, and here comes the value of horticultural education, which teaches you to observe very minutely the behavior of your trees. If the peach orchard is well supplied with potash and phosphoric acid and the ground is full of decaying organic matter, it may be best to sow oats or barley or rye rather than to continue to plant the legumes. In the growing of fruit the proper control of the nitrogen is most difficult and most important, the most important next to the water supply. There is as much objection to too much nitrogen as there is to too little nitrogen. In growing peaches the control of the nitrogen is much more difficult than it is in growing apples. A striking example is the case of an orchard now eighteen years old. For ten years 300 pounds of nitrate of soda was applied annually to a portion of these trees, and nothing was applied to another portion. Where the nitrogen was used the trees made a large and vigorous growth, but produced fewer apples than where nothing was applied. Now these large trees are producing heavy crops, but those not manured had less nitrogen in the soil and in time they began to yield smaller crops. Looking ahead twenty years it is a question as to how fast we should force the wood growth. There is danger that we may not look ahead far enough.

General Seth—Can we use bone meal profitably in the peach orchard where phosphoric acid is lacking?

Dr. Lipman—Bone meal is an expensive source of phosphoric acid. If the cost of the available phosphoric acid is no more than in acid phosphate, it is all right to use the bone meal, and it should be satisfactory to use in a peach or apple orchard. But at present prices I should prefer to use acid phosphate.

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If the bone is to be immediately available, it should be treated with acid to dissolve it. Basic slag is also good, and if your freight charges will allow you to buy it at the price you pay for acid phosphate, it would be a fairly cheap and satisfactory source of phosphoric acid. It contains 17 per cent or 18 per cent of phosphoric acid, but this is not all immediately available. It adds a little lime and helps to keep the soil sweet. Stable manure is worth more than is indicated by the amount of plant food that it contains, for it improves the texture of the soil and adds wonderfully to the quantity of useful bacteria that are found in the soil. As to lime, use the ground limestone on light, sandy soil, but on heavy lands and where the soil is very sour the burnt limestone may be used safely.

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ANNUAL MEETINGS.

Organized, Dover, Delaware, October 21, 1886; J. W. Kerr, Denton, Maryland, elected President.

Special meeting, Wilmington, Delaware, December 15, 1886, J. W. Kerr, presiding.

Dover, Delaware, January, 1888, J. W. Kerr, presiding.

Dover, Delaware, January, 1889, J. W. Kerr, presiding.

Chestertown, Maryland, January, 1890, J. W. Kerr, presiding.

Easton, Maryland, January, 1891. Mr. Kerr presided on the first day and Dr. John J. Black presided on the second and third days of the session.

Dover, Delaware, January, 1892, Col. E. L. Martin, presiding.

Dover, Delaware, January, 1893, George Biddle, presiding.

Dover Delaware, January, 1894, Dr. Henry Ridgely, President, was confined to his home by illness and George Biddle presided.

Dover, Delaware, January, 1895, James S. Harris, presiding.

Denton, Maryland, January, 1896, H. E. VanDeman, presiding.

Milford, Delaware, January, 1897, H. E. Van Deman, presiding.

Snow Hill, Maryland, January, 1898, H. E. VanDeman, presiding.

Smyrna, Delaware, January, 1899, John J. Rosa, presiding.

Salisbury, Maryland, January, 1900, Capt. R. S. Emory, presiding.

Middletown, Delaware, January, 1901, Joseph E. Carter, presiding.

Berlin, Maryland, January, 1902, Orlando Harrison, presiding.

Newark, Delaware, January, 1903, A. N. Brown, presiding.

Cambridge, Maryland, January, 1904, W. G. Dawson, presiding.

Seaford, Delaware, January, 1905, Charles Wright, presiding.

Chestertown, Maryland, January, 1906, James S. Harris, presiding.

Dover, Delaware, January, 1907, S. H. Derby, presiding.

Salisbury, Maryland, January, 1908, W. F. Allen, presiding.

Wilmington, Delaware, January, 1909, James T. Shallcross, presiding.

Centreville, Maryland, January, 1910, W. Irving Walker, presiding.

Dover, Delaware, January, 1911, F. C. Bancroft, presiding.

Pocomoke, Maryland, January, 1912, F. E. Matthews, presiding.

Wilmington, Delaware, January, 1913, F. M. Soper, presiding.

Easton, Maryland, January, 1914, William E. Sanger, presiding.

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TRANSACTIONS

OF THE

Bulletin No 3

PENINSULA HORTICULTURAL SOCIETY

1915

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TRANSACTIONS

OF THE

Twenty-eighth Annual Meeting

OF THE

Peninsula Horticultural Society

HELD IN

Wilmington, Delaware

January 12, 13, 14, 1915

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OFFICERS FOR 1915

President,
GEN. JOSEPH B. SETH, Easton, Md.

First Vice-President,
J. L. SOPER, Magnolia, Del.

Secretary-Treasurer,
WESLEY WEBB, Dover, Del.

Vice-Presidents for the Several Counties.

Delaware:

New Castle—A. W. Armstrong, Hockessin.
Kent—A. W. Slaymaker, Wyoming.
Sussex—O. A. Newton, Bridgeville.

Maryland:

Cecil—Charles B. Warburton, Elkton.
Kent—Walter B. Harris, Worton.
Queen Anne—Harry P. Skipper, Chestertown.
Caroline—J. S. Lapham, Goldsboro.
Talbot—M. B. Nichols, Easton.
Dorchester—Fred Hirst, Cambridge.
Wicomico—Fulton W. Allen, Salisbury.
Worcester—Orlando Harrison, Berlin.
Somerset—Frank E. Matthews, Pocomoke.

Virginia:

Accomac—A. J. McMath, Onley.
Northampton—W. L. Elzey, Exmore.

Executive Committee.

Gen. Joseph B. Seth, Easton, Md.
Eugene H. Shallcross, McDonough, Del.
F. M. Soper, Magnolia, Del.
W. Irving Walker, Chestertown, Md.
S. L. Byrn, Cambridge, Md.

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Peninsula Horticultural Society

TWENTY-EIGHTH ANNUAL MEETING

The twenty-eighth annual session of the Peninsula Horticultural Society was held in Odd Fellows' Hall, Wilmington, Del., January 12, 13, 14, 1915, President E. H. Shallcross, presiding.

The meeting was called to order at 2 o'clock and the Rev. W. L. S. Murray, D. D., of Wilmington, led in prayer.

The address of welcome was made at the evening session by Governor Charles R. Miller, and the response by Mr. James T. Anthony, of Chestertown, Md.

The President appointed the following committees: Auditing, Charles Barker, Walter B. Harris, F. J. Dukes; Nominations, F. M. Soper, J. Howard Hirst, A. W. Slaymaker; Resolutions, W. E. Sanger, Prof. C. A. McCue, J. W. Killen.

The following officers were elected: President, Gen. Joseph B. Seth; First Vice-President, J. L. Soper; Secretary-Treasurer, Wesley Webb. Vice-Presidents for the counties: New Castle, A. W. Armstrong; Kent, A. W. Slaymaker; Sussex, O. A. Newton; Cecil, Charles B. Warburton; Kent (Md.), Walter B. Harris; Queen Anne, Harry P. Skipper; Caroline, J. S. Lapham; Talbot, M. B. Nichols; Dorchester, Fred Hirst; Wicomico, Fulton W. Allen; Worcester, Orlando Harrison; Somerset, Frank E. Matthews; Accomac, A. J. McMath; Northampton, W. L. Elzey. Executive Committee, Gen. Joseph B. Seth, Eugene H. Shallcross, F. M. Soper, W. Irving Walker, S. L. Byrn.

The Executive Committee reported that the matter of erecting a tablet to the memory of J. W. Kerr, the first President of the Society, had been considered, and would recommend that a special committee be appointed to raise money for scholarships in the Maryland Agricultural College, and in Delaware College, in memory of Mr. Kerr and other distinguished horticulturists. The recommendation was approved and the President named W. Irving Walker, of Maryland, and F. M. Soper, of Delaware.

The committee further recommended that the score card now used by the Society for judging fruit be revised, and that fruit intended for exhibition should be packed at harvest time and sent to cold storage to be placed on exhibition without repacking, except in the case of boxes which may be broken in transit. These recommendations were approved, and the Executive Committee was authorized to make the necessary rules to put the recommendations into operation.

Prof. C. A. McCue moved that the Executive Committee be authorized to make an amateur class in the fruit and vegetable exhibition. Upon being put the motion was carried.

Mr. Horace Roberts presented his credentials as a delegate from the New Jersey State Horticultural Society, and was very cordially welcomed.

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REPORT OF THE TREASURER.

WESLEY WEBB.

Receipts.

By balance	$1,783.46	
Delaware appropriation	500.00	
Maryland appropriation	500.00	
Contributed by citizens of Easton and others	404.93	
From Delaware Board of Immigration	500.00	
		$3,688.39

Expenditures.

Easton Star-Democrat	$15.00
Martin M. Higgins	50.00
Emmor Roberts	3.50
Dr. S. W. Fletcher	21.52
Chester J. Tyson	38.16
Dr. Jacob Lipman	20.00
Richard Vincent, Jr	10.00
George Morrison	6.20
C. G. Ritter, stenographer, services, and expenses	25.00
Henry C. Webb	13.20
W. E. Sanger	16.73
F. M. Soper, premiums	287.00
Sanger Brothers, premiums	204.25
E. H. Shallcross, premiums	106.50
Walter B. Harris, premiums	57.50
F. J. Dukes & Brother, premiums	23.00
T. F. Blake, premiums	1.00
F. C. Snyder, premiums	2.00
Mrs. F. C. Snyder, premiums	5.00
N. T. Nelson, premiums	1.00
Robert Symons, premiums	1.50
Mrs. Mary V. Golt, premiums	10.00
Mrs. Theo. Ferguson, premiums	2.00
Mrs. George A. Phillips, premiums	2.00
J. Kingsley Mercer, premiums	2.00

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Brian Langsdale, premiums	$2.00	
John D. Gray, premiums	2.00	
Merrill Culver, premiums	2.00	
J. W. Killen, premiums	27.00	
Joseph B. Seth, premiums	2.50	
J. S. Kelley, premiums	8.00	
J. Howard Hirst, premiums	12.00	
George T. Robinson, premiums	15.00	
James F. Fahnstock, premiums	3.00	
Ambrose Killen, premiums	2.00	
J. T. Shallcross, premiums	10.00	
Sentinel Printing Co., envelopes	9.00	
Easton Star-Democrat, printing proceedings	287.26	
E. S. Godwin, freight	6.37	
Postmaster	11.07	
Idella Huffington	2.00	
Torsch & Frantz Badge Co., buttons and ribbons	31.15	
Sentinel Printing Co., envelopes	18.50	
Wesley Webb, salary and expenses	145.61	
Rent of Odd Fellows' Hall	200.00	
Balance January 12, 1915	1,967.87	
		$3,688.39

REPORT OF THE AUDITING COMMITTEE.

Your committee, appointed to audit the accounts of the Secretary and Treasurer of the Peninsula Horticultural Society, report they have examined the same and found them correct, as follows:

Balance in hand last audit	$1,783.46
Received during the year	1,904.93
Total, including balance	$3,688.39
Disbursements	1,720.52
Balance in hand January 12, 1915	$1,967.87

CHARLES BARKER,
WALTER B. HARRIS,
Committee.

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REPORT OF THE COMMITTEE ON RESOLUTIONS.

Resolved, That we, the Peninsula Horticultural Society, offer our sincere thanks to the I. O. O. F. for the use of their lodge rooms as a place of meeting.

Resolved, That we thank the City Club of the City of Wilmington for their kindness in placing their rooms at our disposal as a place to hold our evening meetings.

Resolved, That we extend our thanks to the Wilmington Chamber of Commerce for their efforts to promote the success of this meeting.

Resolved, That we express our keen appreciation to the retiring president, Mr. E. H. Shallcross, and to the executive committee for their unselfish efforts in making the arrangements for and carrying out the details of this meeting.

W. E. SANGER.
C. A. McCUE.
J. W. KILLEN.

The place of holding the next meeting was left to the decision of the executive committee.

REPORT OF JUDGE ON FRUITS.

PROF. ARTHUR J. FARLEY, New Brunswick, N. J.

For Best General Display of Apples—First prize, $150, to F. M. Soper & Son, Magnolia, Del.; second, $125, Sanger Bros., Cordova, Md.; third, $100, E. H. Shallcross, McDonough, Del.; fourth, $75, Walter B. Harris, Worton, Md.; fifth, $50, A. W. Armstrong, Hockessin, Del.

Best Single Box—First, $25, F. M. Soper & Son; second, $15, Sanger Bros.; third, $10, A. W. Armstrong.

Best Three Boxes—First, $15, Sanger Bros.; second, $10, F. M. Soper & Son; third, $5, Walter B. Harris.

Best Five Boxes—First, $25, Sanger Bros.; second, $15, Walter B. Harris; third, $10, Soper & Son.

Best Ten Boxes—First, $50, Sanger Bros.; second, $30, Walter B. Harris; third, $15, Soper & Son.

Best Three-barrel Collection—First, $15, Walter B. Harris; second, $10, Soper & Son; third, $5, E. H. Shallcross.

Best Single Box of Varieties—First, $5; second, $3; third, $2:

Grimes—First, Sanger Bros.; second, E. H. Shallcross; third, W. H. Conard, Dover, Del.

Jonathan—First, E. H. Shallcross.

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Lankford—First, Soper & Son; second, E. H. Shallcross.

Nero—First, Soper & Son; second, E. H. Shallcross; third, W. H. Conard.

Paragon—First, Walter B. Harris; second, Soper & Son; third, W. H. Conard.

Rome—First, Sanger Bros.; second, Soper & Son.

Stayman—First, Soper & Son; second, Walter B. Harris; third, A. W. Armstrong.

Stark—First, Walter B. Harris; second, E. H. Shallcross.

Winesap—First, Sanger Bros.; second, Soper & Son; third, E. H. Shallcross.

York Imperial—First, Walter B. Harris; second, E. H. Shallcross; third, Sanger Bros.

Best Single Barrel of Varieties—First, $5; second, $3:

Ben Davis—First, Walter B. Harris; second, E. H. Shallcross.

Grimes—First, E. H. Shallcross.

Paragon—First, Walter B. Harris.

Stayman—First, Soper & Son; second, A. W. Armstrong.

York Imperial—First, Sanger Bros.; second, E. H. Shallcross.

Best Single Plate of Apples—First, $1.50; second, 75 cents:

Ben Davis—First, E. H. Shallcross; second, Walter B. Harris.

English Redstreak—First, E. H. Shallcross; second, Soper & Son.

Gano—Second, Soper & Son.

Grimes—First, E. H. Shallcross; second, Sanger Bros.

Jonathan—First, E. H. Shallcross.

Lawver—First, Walter B. Harris; second, Soper & Son.

Lankford—First, Walter B. Harris; second, A. W. Armstrong.

Limbertwig—First, E. H. Shallcross; second, Soper & Son.

Nero—First, Soper & Son; second, A. W. Armstrong.

Nickajack—First, Soper & Son.

Paragon—First, Walter B. Harris; second, Soper & Son.

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Rome—First, Sanger Bros.; second, Soper & Son.

Smith Cider—First, Walter B. Harris; second, E. H. Shallcross.

Stark—First, E. H. Shallcross; second, Walter B. Harris.

Stayman—First, A. W. Armstrong; second, Soper & Son.

Winesap—First, Soper & Son; second, Sanger Bros.

York Imperial—First, Walter B. Harris; second, E. H. Shallcross.

Nuts.

Best Collection of Nuts—First, $5, to J. S. Kelley, Preston, Md.; second, $3, J. W. Killen, Felton, Del.

Best Collection Chestnuts—First, $5, to J. S. Kelley; second, $3, to J. W. Killen.

REPORT OF JUDGE ON VEGETABLES.

W. C. PELTON.

Best Collection of Vegetables—First, $25, J. Howard Hirst, Cambridge, Md.; third, $10, G. W. Burris, New Castle, Del.

Best Cabbage—First, $1.50; second, 75 cents:

Danish Baldhead—First, S. H. Warren, Montchanin, Del.

Flat Dutch—First, J. Howard Hirst.

Houser—First, J. Howard Hirst.

Potatoes, Educational Collection—First, $25, Harvey Ball, Marshallton, Del.; second, $15, J. T. Shallcross, Middletown, Del.

Best Collection of Barrels of White Potatoes—$5, F. J. Dukes, Girdletree, Md.

Best Seven-eighths Basket of Varieties—First, $2; second, $1:

Early Puritan—First, Naudain & Son, Marshallton, Del.

Green Mountain—First, F. J. Dukes, Girdletree, Md.; second, J. Howard Hirst.

Irish Cobbler—First, F. C. Snyder, Newport, Del.; second F. J. Dukes.

McCormick—First, F. J. Dukes.

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Rehoboth—First, F. J. Dukes.

St. Lawrence Prize—First, S. H. Warren.

State of Maine—First, F. C. Snyder.

Sweet Potatoes—First, $2; second, $1:

Big Stem Jersey—First, F. J. Dukes; second, J. W. Killen, Felton, Del.

Red Jersey—Second, J. W. Killen.

Best Slip Seed Sweet Potatoes—Second, $1.50, W. B. Gordy, Laurel, Del.

Carrots—First, $1.50, J. Howard Hirst.

Celery—First, $1.50, J. Howard Hirst; second, 75 cents, George W. Burris.

Kale—First, $1.50, J. Howard Hirst.

Parsnips—First, $1.50, J. Howard Hirst.

Parsley—First, $1.50, G. W. Burris; second, 75 cents, J. Howard Hirst.

Pumpkins—First, $1.50, J. Howard Hirst; second, 75 cents, J. W. Killen.

Onions—First, $1.50; second, 75 cents.

Danvers—Second, J. Howard Hirst.

Silverskin—Second, J. Howard Hirst.

Salsify—First, $1.50, J. Howard Hirst.

Spinach—Second, 75 cents, J. Howard Hirst.

Turnips—First, $1.50, J. Howard Hirst; second, 75 cents, G. W. Burris.

Beets—Second, 75 cents, J. Howard Hirst.

Best Exhibit of Canned Goods by Housekeeper—First, $10, Mrs. F. C. Snyder, Newport, Del.

Best Exhibit of Canned Fruits and Vegetables Canned by Mother and One Daughter—First, $10, Mrs. F. C. Snyder and Ethel Snyder, Newport, Del.

Best Exhibit of Canned Fruits and Vegetables by Girl—First, $10, Ethel Snyder.

Largest Variety of Fruits Canned, Preserved, and Jellied from One Farm—First, $10, Mrs. F. C. Snyder.

Largest Variety of Ways of Canning, Preserving, and Jellying Apples—$5, Mrs. F. C. Snyder.

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ADDRESS OF WELCOME.

HON. CHARLES R. MILLER, Governor of Delaware.

I am glad to meet the farmers and fruit growers of the Delaware and Chesapeake Peninsula and to give them a cordial welcome. In the early history of our country Delaware separated from Pennsylvania, but unfortunately the Peninsula was not formed into one State, and, therefore, we have present, as members of the Peninsula Horticultural Society, gentlemen and ladies from Maryland and Virginia, but the welcome accorded you all is no less cordial than it would be if you were all Delawareans.

The Peninsula Horticultural Society and the Experiment Stations and other agencies are doing much to develop the agriculture of this Peninsula. The farmers are becoming very much more intelligent upon the subject of plant nutrition than they were a few years ago and upon all subjects connected with successful agriculture. It has been found that plant nutrition is practically the same as animal nutrition, and the study of these subjects go together. Their study has led to a more intensive system of agriculture and horticulture on the Peninsula, and present conditions warrant the belief that this culture will be more and more intensive until we make the Peninsula a fruit and vegetable garden. I am glad to have this opportunity to speak to you, for the Peninsula Horticultural Society more than any other agency that I know has been successful in developing the horticultural interests of the Peninsula.

I want to speak also of the agricultural colleges. Delaware College is growing rapidly and is one of the agents that will help our agriculture. I predict that next year this institution will have 350 students, and that it will continue to grow in attendance and in usefulness. I ask you gentlemen who live in Delaware to give it your cordial and most active support.

We can learn something from Germany. When I was in that country a few years ago I was greatly impressed by the careful manner in which everything was conserved. A man there can not cut a tree on his own land without permission from an agent of the government. When he wishes to cut trees he must apply for permission and an agent comes and marks the trees that are to be removed. The owner must then preserve every twig and these twigs are bound up in bundles and used or sold as fagots. Germany is not so large as Texas. You could take a piece as large as all of the New England States out of Texas and then leave as much land as there is in Germany.

I learn from an article in the National Geographic Magazine that, although embracing only one-fifteenth of the area of Europe, Germany, in 1912, produced

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one-seventh of its wheat, a fifth of its oats, more than a seventh of its barley, more than a fourth of its rye, and over a third of its potatoes. It yields place among the producing nations of Europe only to Russia.

To what a remarkable extent the German farmer has mastered the science of agriculture is shown by a comparison of his per acre yield with our own. If we had grown as much wheat to the acre in 1913 as the Germans, our crop would have been two and one-half billion bushels instead of three-fourths of a billion bushels. If our farmers had grown as much oats to the acre as the Germans, our yield would have been 60 per cent of the world's oat crop instead of the 25 per cent that it was. Had our barley harvest been as heavy per acre as that of the German farmer, we would have had 375,000,000 bushels instead of the 178,000,000 bushels. If our potato growers had grown as many tubers to the acre as the German potato growers, our yield would have been 865,000,000 bushels instead of 331,000,000.

While the American farmer uses many acres and gets a small yield, the German farmer uses a very few acres and compels the ground to give him a large yield. There are approximately the same number of farms in Germany as in the United States—5,756,000 in Germany and 5,737,000 in our country. The Germans have fewer than 700,000 farms that are larger than 25 acres in extent.

The German farmer is not like the American farmer when it comes to choosing the good land and allowing that which is not so good to lie idle. More than 50 per cent of the farm area of the United States is unimproved, while only 9 per cent of the available area in Germany lies unused.

We have waste land that should be cleared and that should be drained and made productive. We should, by the most scientific and careful management of soil, the most painstaking saving of all materials that can act as a fertilizer or plant food, by the most intelligent application of commercial fertilizers, and by the selection of crops that are adapted to our soil and climate, make the Peninsula equal, or superior, to Germany, acre for acre, in the production of crops and in the net profits that will come to the farmer from these crops.

Again I bid you a hearty welcome. We are glad to have the Peninsula Horticultural Society meet in Delaware. We are glad to have it meet in Wilmington, so that the people of our chief city can see with their own eyes and taste for themselves the finest products of the orchards and gardens of this most favored spot; for your fruits and your vegetables are as fine as any produced in any land.

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RESPONSE TO ADDRESS OF WELCOME.

J. T. ANTHONY.

The course which circumstances have taken this evening is at one and the same time a great honor and a tremendous surprise to me—an honor to be called upon to respond to the eloquent words of welcome from your chief executive, and a surprise to be substituted for the vice-president of this society, General Joseph B. Seth, of Easton, Md., who is so eminently qualified to voice the sentiments of the society in words fitting and beautiful. While we sympathize with you in your deprivation, we congratulate you in the splendid reception extended by the people of Wilmington and this part of the Peninsula, and not least by the kind and generous words of welcome from his excellency, the governor of Delaware.

We congratulate you again on the progress the farmers of this country are making along many lines. The hayseed of the past has become the farmer of the present, an acknowledged force and factor to be reckoned with in working out many of the great problems of the day. The Department of Agriculture receives its share of commendation with the other departments. Agricultural colleges and experiment stations have come into being in the several States where our boys receive special training for the business of farming. Bulletins containing the cream of investigations and experiments carried on in the different States and at the National Department are ours for the asking. Our local societies, granges, and clubs bring us together in a capacity where each gets gratis what the other fellow knows, even though he has spent many years of diligent work and thought in its acquisition. So that the tie of brotherhood has grown stronger by association, and a better understanding among the people in the different walks of life has been accomplished, and the old animosity which once existed between the hayseed and the professional man no longer finds a place among us. "Let not the hand say to the foot, I have no need of thee." We realize that we are all members of the same body, and we, the members of the Peninsula Horticultural Society can not only shake hands in fraternity with our brethren across the Mason and Dixon's line, but can loose our grip upon the plow handle to shake the hand of the governor of the state, or the highest representative of our National Commonwealth, with a common feeling of good will and charity. We, therefore, congratulate ourselves on being at peace with one another and at peace with all the world. "So let it be." Long live the Peninsula Horticultural Society.

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PRESIDENT'S ANNUAL ADDRESS.

E. H. SHALLCROSS.

Members of the Peninsula Horticultural Society, Ladies, and Gentlemen:

We have met here for the twenty-eighth annual meeting of the Peninsula Horticultural Society, and while feeling honored that I have been called upon to preside over your meetings, I feel especially honored, as I believe I have the honor of being the first son of a former president to come to the office of president of this society.

We have been looking forward to this meeting as being the best the society has ever held. Our 1913 meeting, held in this city, was a good success, and we have come back this year hoping to surpass every feature of the 1913 meeting, thus showing the advance the society has made in two years.

In selecting the Odd Fellows' Hall as the place of holding our exhibit, we feel we have the best hall we have had in years to display our products.

Orcharding today is essentially a business proposition and not merely an agricultural pursuit. Judgment as to the proper varieties of fruit most profitable for the soil and climate of the particular district, skill in developing the orchard or vineyard and combating fruit pests, the proper thinning, picking, packing, and last and most important of all, marketing the crop, make orcharding both a scientific and a business enterprise, vastly more interesting and certainly more profitable than the old systems of agriculture, which consisted principally of sowing and reaping. Hence it is we find men of large affairs enjoying the business of orcharding and looking forward to making that business their principal work. All up and down this Peninsula we find business men engaged in orcharding for profit, for future happiness and satisfaction, or for the purpose of giving the family of growing boys a chance to learn self-reliance by doing things that are worth while, or for a future home, without the harrowing cares of the city.

The popular call "Back to the Soil" applies more particularly to orcharding and the mixed farming necessary and incidental to orcharding. Don't let us overlook the dairying, the pigs and chickens, the small fruits, vegetables, and gardens. Don't advise the new orchardist to put all his ground into trees except enough to spare for a house and a barn because he can grow enough fruit on 1 acre to buy more hay than he can raise on 5 or 10 acres. Such advice has too frequently been given.

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The great desideratum of every person is a happy home, and that means something more than a mere farm built to make money. Each of you will draw your own picture of the kind of farm home that will make you most happy. Some will have most of it in orchard, with only enough pasture for a horse and cow, or perhaps only for a cow, and use an automobile instead of a horse. Some will have most of it in various crops and only a small orchard.

With the rapidly increasing population of the United States (and with the area of the public domain practically at an end) the tendency in all districts where intensive farming is done is to subdivide the farms. This makes the rural population more dense and brings about better schools, better social conditions, better roads, better mail service, and many other betterments.

With the increasing number of trees being planted it behooves us to look out for our markets so that we will avoid the otherwise possible penalty of overproduction and unprofitable prices. Our principal fruit, apples, can be marketed all over the world, in time of peace, and the world is a big place.

We still hope that within the next generation or two the people of the East will have learned something about varieties and section of country they are grown in, and will know the difference between such apples as Jonathan, Stayman Winesap, Winesap, Nero, and other good apples from the Ben Davis, Lawver, Arkansas Black, and other good-looking and good-keeping apples that do not please the taste.

It seems such a simple thing to learn and know a few of the really good varieties, and yet there is no denying the fact that the great majority of consumers buy an apple on its looks. An apple is an apple and all red apples look alike to them.

A very great increase of the consumption of apples is bound to be brought about, but it is up to us as growers, as Horticultural Society, and other organizations, to educate the consuming public as to the good varieties and the season during which they are in the best condition.

New York State passed a law last year setting forth standard grades for apples to be packed in, establishing standard packages, and requires all packages to be standardly marked as to just what they contain. We hear the cry from those people that that law has worked a hardship upon the fruit growers, and why? Those of us that know New York apples and New York's way of packing, the answer is very easy. New York has not known what it was to grade apples, and being compelled by law to change her ways all in one year has necessarily worked a very deserving hardship upon the growers.

The Legislature is now in session in this State, and we fruit growers should get together and formulate a strict grading and standard package bill and exert all our efforts to get it passed by our Legislature. It will, I believe, be the next greatest boost to the apple growers of the State, and we should ask our sister States belonging to the society to exert themselves in the same direction.

We growers in the East should organize, should form an association similar to those in existence in the West. The time is coming when we must organize

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Serving Baked Apples, Wilmington, 1915.

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if we wish to stay in business. The Panama Canal is going to decrease freight rates from the West to our Eastern markets, thus making competition with Western apples keener than ever before.

I realize that the organization of a fruit association is a problem that the solution requires more than a formal resolution. I appreciate the fact that combination of several hundred growers in several States is not a task to be approached with a light heart. The man or committee of men who accept the commission will well earn the salary of thanks that may be accorded to successful attempt. But, gentlemen, the task can be accomplished. It has been accomplished elsewhere, and it must be accomplished in the East in the near future.

We have sufficient examples in the trusts, who control to a large extent the marketing part of the products of the farm. The beef trust is a fair example of what results from the farmers' neglect of their own duty.

A good many years ago a young man was in Chicago on his way West, and there he met a delegation party as a visitor, and they asked him what he was going West for, and he said, "I am going out to Wyoming to engage in herding cattle." They sneered at him and said, "You better join with us; we are going to make an organization to herd the herders," and if we don't look out we will find ourselves in the same position. While we are picking apples the trust will be picking us.

Growers of large orchards may think they would get the worst of it by co-operating with the growers of small crops or inferior fruit or dishonest packing. But there would be no grounds for such opinions. An association is the one thing that brings the varieties, grades, and pack to their proper level. The dishonest pack does not go.

A fruit growers' association should be regarded strictly as a business institution, a co-operative concern. For the successful operation of an association sufficient capital is necessary to give it a creditable standing as a business institution. The very fact that growers have advanced a good working capital for the project is in itself an indication of a united effort and a union of strength. It inspires confidence in everybody, and the lack of capital denotes doubts and fears, and a feeling that the matter is an experiment. There is no occasion for anyone to doubt the benefits of an association. You may very properly doubt wheteher you can run one skillfully at first, but you should not take your mistakes too seriously. If all the farmers who make mistakes were to quit farming, the world would soon go hungry.

As to the best method to secure the capital and operate the business the stock corporation is usually to be preferred. A stock corporation is created under the laws of the State in which it exists and affords the investor the best possible protection that law can give. It is also a self-perpetuating body, which is a great advantage over the usual membership organization, whose life may be so easily and suddenly terminated.

A stock company with shares of $10 each, and which requires each grower

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to purchase one share for each acre he has in fruit at bearing age, and give his note with interest after for the unbearing portion and due when trees come in bearing. This plan, I believe, would furnish as nearly an equitable basis for starting as can be found. The remaining details could be worked along the same line, which I will not undertake to numerate here.

While this society of fruit growers consists of a comparatively small portion of those actually engaged in the business on this Peninsula, yet it behooves us to work just as diligently for the industry as though every grower was a member of the society. Instead of a membership of several hundred we ought to have a membership of several thousand.

The work of this society would be most important. Problems pertaining to the growing of fruits, keeping the country free from pests, needed legislation and marketing, all make it important that an organization and a system be properly worked out in the interests of the fruit growers of the Peninsula.

In this work some members must give of their time, their experience, and their wisdom, without hope of financial reward, or even of the thanks of those who will be benefited. The prosperity of a large number of our citizens is at stake, and it becomes a patriotic as well as a religious duty to exert our most earnest efforts to promote general welfare.

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REPORT OF COMMITTEE ON APPLES.

J. L. SOPER.

Previous to 1913 it was the custom of the chairman of the committee on apples to deliver a paper to the society, in which he would dwell on the main factor of raising and marketing of the apple. Times have changed, and it is now his duty to report to the society the conditions as they existed during the past season.

The season of 1914 may be rightly known as a full-crop year. Because of the large yield and the conditions attending the marketing of the crop, you as raisers are familiar with every detail and there is nothing that you do not already know.

There was a full set of bloom followed by a heavy set of fruit, due to the healthy condition of the trees. In nearly all instances this fruit reached maturity. Where it did not in some cases it was due to a failure of the grower to do his part, while in others he could not have bettered his conditions. Conditions relative to injury from fungus diseases and insect pests were about normal, some growers reporting that where proper spraying had been done there was practically no injury, while others report that the scab, Baldwin fruit speck, and our old annual, the bitter rot, again put in their appearance. In some cases the drought prevented the fruit from attaining its proper size, while in others there was apparently no injury due to the drought.

Last season was a full-crop year. By full-crop year I mean that the majority of the trees were due to yield more fruit than on the previous year. During the last year we saw harvested the largest crop of early apples. Taken as a whole, the prices obtained by the grower were not as high as usual, which was due, no doubt, to the large yield and the conditions that existed throughout the country. Prices ranged from poor to very good. Yellow Transparent proved to be one of the best money-makers; the crop sold at around a dollar per seven-eighths basket, and some sold for as much as $1.57. Early Ripe, Fourth of July, and Williams also sold at good prices. The Red Astrachan, with other varieties, proved to be less desirable by the trade. It seems that the days of the Astrachan are numbered because of its poor carrying qualities. The Williams still maintains its position as a money-maker for the grower. I wish to cite one case which is above the average. A grower in the southern part of Kent County, Del., sold his entire crop at $1.75 per seven-eighths basket on the New York market. There are two reasons why he received such a price—first he must have raised fine fruit, and in the second place he guaranteed his pack and lived up to the guarantee. That guarantee was that every apple in the pack was perfect with the exception of one. This shows what can be done on the Peninsula and that shows that there can not come from any other section of the country a pack which can surpass it.

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There were sent to market probably more small apples than ever before and the main culprit was the Yellow Transparent. It seems that when the treees of that variety reach a certain age they produce small apples, although in every other respect they are the equal of the ones produced previous to that age. Another characteristic is becoming noticeable, that of young trees producing the small apples. It appears to me that it is not wise for us to select propagating wood from such trees as bear small apples nor from young trees that have formed the habit of bearing apples of inferior size at such an early period in what should be their age of usefulness. This habit also suggests to one's mind that there is an age limit to the profitable production of apples by certain varieties and trees of the same.

For several years past we have listened to people saying that the apple business would soon be overdone, and they would call your attention to increased plantings, and, together with the rule of low prices generally, now think that the fact has been established. But is such really the case when we have another condition forced upon us, that of having to realize that there is a profit limit to the age of some, if not all, our trees? The planting of apple trees has not been overdone if we are to depend on the fruit produced from the younger trees to supply the trade. Were the old trees whose days for bearing large fruit removed and replaced by new orchards the market would be clear of the small fruit, which tends to force down even the price of good fruit; and no doubt the grower would realize increased returns from his land.

As for late varieties, there was about a normal crop of Stayman, the finish of which in some sections was not all that was desired; Nero, good to full crop; Stark and Ben Davis, a full crop; Winesap, a good crop, though in some parts they were under size; York, a fair yield.

The greater part of the marketable apples were placed in storage. Packages used were seven-eighths basket, barrel, and box. It goes without saying that the best grades were packed either in barrels or boxes. It appears that the box is the only package to use for our very best fruit. Practically all the late pack is in storage and has not been moved yet. For that which has been disposed of, prices have ranged from $2 to $6 per barrel and as high as $3 per box.

Just a word in regard to our displays. They are made with a threefold purpose in view—first, that the exhibits might be compared; secondly, we may receive sufficient funds to defray expenses preparing and displaying of the same, and third, display is an advertisement. Therefore we should not be permitted to enter any box fruit in competition unless it comes within the limit as regards the number of apples it contains. If for show purposes, make it a strictly show pack, without paper wrappers, a specified system of packing.

Suppose our display consisted entirely of the strictly show pack, the 112 which is the most beautiful, how much more beautiful would it be?

A decision of a judge should not be accepted unless he has seen the apples in the bottom of the box.

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PREPARING APPLES FOR MARKET.

S. B. SHAW, Extension Service, Maryland Agricultural College.

In discussing the preparation of apples for market, there are many features to be taken into consideration. An attempt to take up this subject in detail would cover too broad a field on an occasion of this kind. Much has been written and a great deal said of this phase of fruit growing, but there is still room for improvement. A visit to the markets in many of our cities would emphasize the importance of greater care in the production of the crop. An eminent authority has said: "The business part of fruit growing is chiefly concerned with the broad subject of marketing the fruit, which may be considered under the four heads of picking, packing, storing, and shipping. The actual selling of the product is an enterprise which belongs rather to the merchantman than to the fruit grower." True as this may be, the relative value of the product is more often established by the conditions under which it has been produced. No manufacturer would consider placing an article on the market without first investigating carefully every detail connected with its production. It is just as much a business proposition for the orchardist to grow his crop as it is for him to sell it.

Each of the many sections of country has, to a certain extent, its own particular characteristics necessitating a different method for growing and handling fruit for various markets. There are, however, some operations cannected with this industry that can be carried on in the same general way one place as in another. Color, size, and condition are qualities required in the preparation of all fruit for securing and holding a select trade that will be profitable. In order to develop these qualities to their fullest extent, it is necessary to give more attention to certain operations than is common with many orchardists. One of the most important of these is the method of growing the crop.

Let us assume that a suitable location has been selected, the land properly prepared, and good trees planted. Then a careful system of cultivation should be practiced. The term cultivation, as used here in a broad sense, means not only the tillage of the soil, but the systematic training of the trees and their protection from insect and fungous enemies. This work deserves the most careful consideration, for the preparation of all fruit for market really begins with its production. Profitable commercial fruit growing requires more than simply planting an orchard and waiting for it to mature and yield. The successful orchardist must exercise intelligent care over his fruit tract at every step, from the selection of his trees to the shipping of the ripened fruit.

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Trees grow, develop, and mature their fruit in proportion to the amount of available food at their disposal. The greater part of this food is in the soil, occurring naturally, or supplied by artificial means. It can not, however, be made use of by the trees until rendered available. This condition is brought about by the combined action of several agencies, most important of which are light, air, and moisture. Tillage promotes the work of these agencies and, as a result, influences the growth of the trees, thereby effecting the development and quality of the fruit. Trees draw most of their vitality from the soil through their roots; thus it stands to reason that for the best results the soil must be so treated as to furnish most easily and surely the food elements which the growing trees require. Because of such a wide range of conditions, the most profitable method of procedure is a problem to be solved, more or less, by each individual grower.

Systematically training the growth of trees is an influential factor in producing marketable fruit. Apples must be of good uniform size and be well colored to sell to best advantage. While it is especially essential to have a normal amount of leaf growth, it is well to have it so distributed as to avoid any unnecessary shading of the fruit. Water sprouts, overhanging limbs, and an excess of leaf-producing wood should be cut out whenever practicable. Prune conservatively but well. Apples produce their fruit on old wood and it is not advisable to promote an excess of new growth unless it be to rejuvenate old trees. Exposure to plenty of sunlight and a free circulation of air throughout the growing season will go far toward increasing the value of a crop of apples.

The thinning of fruit may also be regarded as a form of training. Repeated demonstration has shown this to be a very profitable practice. Thinning not only causes the development of much finer fruit, but it is a means of conserving the energies and vitality of the trees. Orchards that bear heavily one year, do not, as a rule, produce much fruit the following year. A heavy crop of fruit and a large number of fruit buds can not well be developed at the same time, consequently many trees perform each function in alternate years. In some parts of the country systematic thinning has come to be regarded as an indispensable element in successful fruit growing. It costs but little, if any, more to thin at the proper season than it does to pick the same fruit at harvest time. The method of doing the work is practically the same in both instances.

Thirty or forty years ago there was little need to fight orchard pests, as the injury caused by them was scarcely appreciable. At the present time, particularly in other sections of the country, insects and fungous diseases of various kinds have become so widespread that the question of spraying is now as important as any other part of orchard management. Many growers assert that it is the most important single operation. This marked change, coming in so short a time, and in numerous instances causing serious loss, has habiturally been discouraging. As a result many orchardists have been slow to adapt themselves to these new conditions. Although the combating of insect and

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fungous enemies has, without doubt, increased the cost of production, those who have persistently used proper means for their control have been universally successful in raising good crops of high-grade fruit. The well-developed, finely colored, clean, and attractive products of the orchard command the highest prices. Careless, indifferent cultivation and the unchecked ravages of different insects and fungi are principally the cause of under-sized, poorly colored, diseased, and unattractive fruit. Apples of this kind are a glut on the market, for buyers do not care for them. True, they may sell, but it is usually at a price that is not at all profitable.

The state of maturity at which apples can best be picked depends upon the varieties and the purposes for which they are intended. Summer varieties for local markets need not be gathered until fully ripe. Fall and winter fruit, to be disposed of in the same way, may be allowed to ripen fully, but should be picked before the mellowing process begins. The best time of harvesting each variety, in different localities, can be determined only by experience. The natural ripening habit of the fruit and the purpose for which it is intended are the best guides. Harvest always by hand, grasping the fruit firmly and with a slight rolling and bending movement disjoint the stem from the fruit spur. Any other method not only damages the fruit but destroys more or less of the fruiting wood of the tree. A padded half-bushel basket with swing handle is about the most satisfactory receptacle into which to place the fruit as it is picked. A stout wire hook bent in the shape of the letter "S" is convenient for hanging the basket on the limbs or ladders.

Probably the most important operation in preparing apples for market is the grading. As stated before, this work can best be started with the growing of the crop. Careful cultivation means fewer culls and less expense for sorting. There is a vast difference of opinion in regard to this operation and many attempts have been made to establish some system of universal grading. The chief difficulty in successfully carrying out such a project is the great amount of variation in the same varieties when grown in different localities. Various types of soil, climatic conditions, and methods of production influence the characteristics of most varieties to such an extent as to make it almost impossible to give definite specifications that will suit all conditions. Nevertheless there are some rules that would apply to all varieties grown under any condition. Apples to be marked "Extra Fancy" should be that in every respect. They should be fully developed, of uniform size and color characteristic of the variety as grown in that locality; entirely free from insect injury, disease or other blemish, and should retain their stems. Subsequent grades can be made as desired, keeping in mind, however, that each grade should be strictly as represented.

Packing and grading are so closely related that they may be considered almost as one operation. No matter what package is used, be it basket, box, or barrel, see that each is filled with the same grade throughout. Do not mix grades in packing. The only way the orchardist of today can hope to success-

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fully meet competition is to first produce the fruit and then put up a pack that amounts to something, reflecting credit on his ability and business integrity. The "standard of excellency" of all growers could well be to have in each package every specimen as nearly like the others as is possible. "Every grower's pack should be as good as his bond." Mixed grades give the buyer an opportunity to discriminate, and often result in the grower not getting the full value of his crop. Apples should be cool and dry before being packed. Heat and moisture promote decay, a condition that unless guarded against will result in loss. Each package should be well filled with the contents placed firmly and snugly. Unless this is done it will reach its destination in what is commonly called a "slack" condition. Loose packing invariably causes bruises and general defacement. For the same reason, too, tight packing should also be guarded against. Aim to have the fruit reach the consumer in the best possible condition. There is a "happy medium" in packing that can be learned only by experience.

In the selection of packages use those best suited to the grade of fruit, and for which there is the greatest demand on the market to which a consignment is made. The package of today is an influential factor in the apple business. Many growers do not consider the relation the package bears to the selling value of their fruit. Should the market want your particular apples in baskets, ship in baskets. If it be barrels that are most called for, use barrels. Perhaps boxes are most in demand; then sell in boxes, but in whatever package used, keep up the standard of quality and pack. Do not use a certain package simply because some other section uses it to advantage, unless there is sufficient demand to warrant shipping that way. Give the trade what it wants, when it wants it, and as it is wanted.

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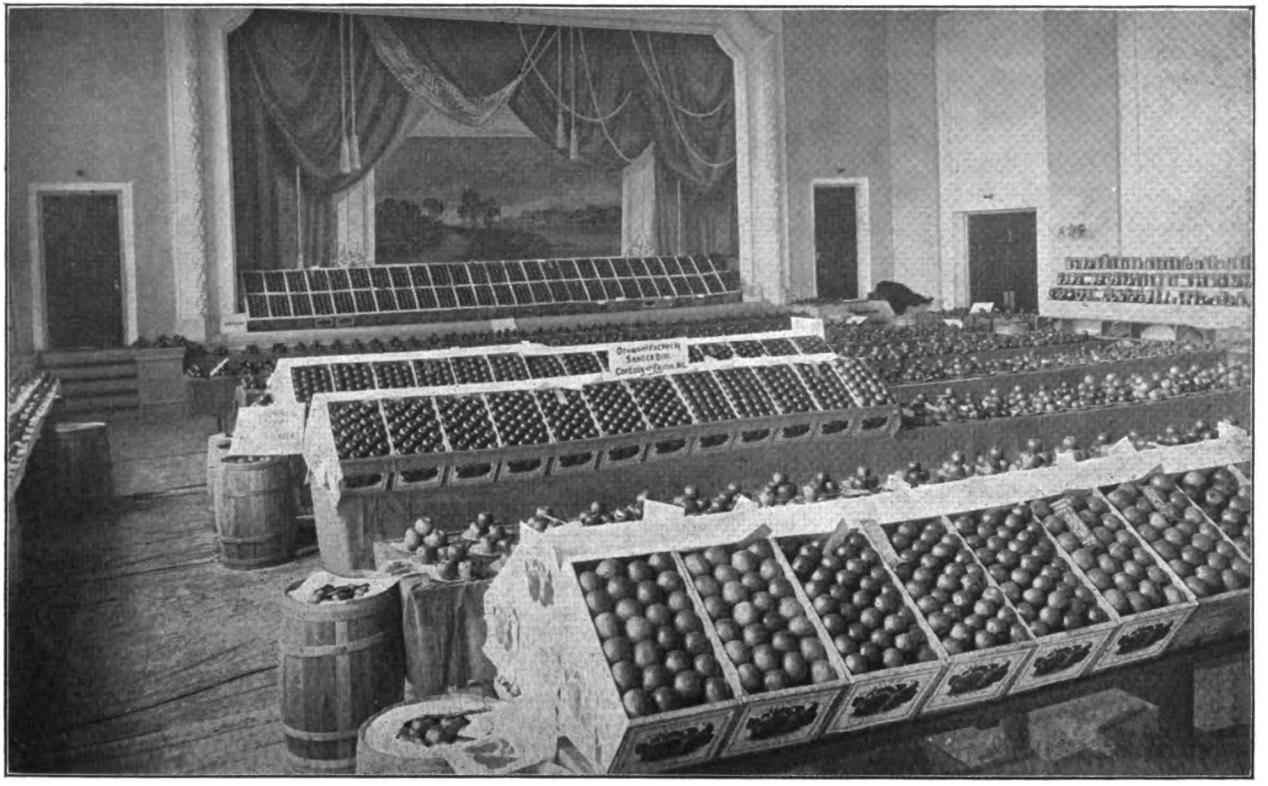

Part of Apple Exhibit, Wilmington, 1915.

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FRUIT GROWING IN WEST VIRGINIA.

PROF. W. H. ALDERMAN, Horticulturist, University of Virginia.

It gives me great pleasure to meet the fruit growers of this Eastern Peninsula. Delaware and the Eastern Shore of Maryland and Virginia make up a section that is of great interest to horticulture, and the Peninsula Horticultural Society has an enviable reputation. But when I was asked to come to you and tell you something about fruit growing in West Virginia I wondered what I could talk about that would be of interest or value to you on this level Peninsula; for I come from the mountains of West Virginia, where our orchards are on the hillsides. In these steep hillside orchards clean culture is impractical, for tillage would so loosen the soil that in winter and spring the soil and trees might be washed into the valley below. Partial or strip cultivation is the best we can do in the mountain orchards. Neither can I tell you much about varieties, because we have a climate that is in some parts of the State comparable with Maine and New England, and we have a very small area that is comparable with yours. Nor can I tell you much about pruning. That subject might afford good discussion, but the pruning that is necessary with us might be very different from that required by you. We have to build our trees so that they are strong and low to the ground. I do not know that I can tell you very much about marketing. Indeed, we need someone to come and tell us about marketing. So I did not know what I could talk about, but I finally decided that there are two things that I might discuss for a little time that might be of interest to you, not because we are doing them right, or that we have come near perfection in doing them, but because we think that we have found out something about them. I refer to thinning of apples and peaches and the use of commercial fertilizers. The first has a bearing upon the subject that Professor Shaw discussed, the preparation of fruit for market, for thinning has a marked influence upon the quality of the fruit. As I have come before you with no formal or prepared address, I shall be pleased to have you repay my informality in kind and ask questions whenever you desire.

Now, to take up the thinning proposition, we in West Virginia have come to the conclusion that we can not raise good fruit unless we thin it. We lose too much money by not thinning. I have some figures showing the results of work done with Ben Davis, York Imperial, Rome, and Baldwin apples, the trees ranging from 10 to 20 years of age.

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RESULTS OF THINNING APPLES.

Variety.	Thinning distance.	Per ct. under 2¼ in.	Per cent 2¼–2¾ in.	Per cent 2¾ in. up.
Ben Davis.....	Not thinned.....	69 per ct.	31 per ct.	0 per ct.
" "	3–4 inches.....	31 per ct.	69 per ct.	0 per ct.
" "	6–7 inches.....	14 per ct.	71 per ct.	15 per ct.
" "	9–10 inches.....	24 per ct.	70 per ct.	6 per ct.
York Imperial.....	Not thinned.....	11 per ct.	67 per ct.	22 per ct.
" "	3–4 inches.....	11 per ct.	73 per ct.	16 per ct.
" "	6–7 inches.....	11 per ct.	61 per ct.	28 per ct.
" "	9–10 inches.....	2.6 per ct,	60 per ct.	37.4 per ct.

Variety	Thinning distance.	Per ct. under 2½ in.	Per cent 2½–3 in.	Per cent 3–3½ in.	Per cent 3½ in. up.
Rome.....	Not thinned...	22 per ct.	50 per ct.	27 per ct.	1 per ct.
"	3–4 inches.....	12.5 per t.	45 per ct.	38 per ct.	3.5 per ct.
"	6–7 inches.....	15 per ct.	42 per ct.	38 per ct.	4 per ct.
"	9–10 inches....	4.5 per ct.	37 per ct.	56 per ct.	2.5 per ct.
Baldwin....	Not thinned...	19 per ct.	80 per ct.	9 per ct.	0 per ct.
"	3–4 inches.....	5 per ct.	73 per ct.	23 per ct.	1 per ct.
"	6–7 inches.....	.7 per ct.	40 per ct.	57 per ct.	2 per ct.
"	9–10 inches....	.7 per ct.	14 per ct.	74 per ct.	11 per ct.

These figures indicate that by thinning we get better fruit the current year and we believe insure the crop of fruit the next year. There is no experiment station work that proves the latter proposition, but there is public opinion to sustain it. It is believed that if thinning is carried on systematically over a period of several years it will insure a crop every year.

A study of the accompanying table will show what effect thinning had upon the four varieties indicated. It will be noticed that thinning to a distance of 3 or 4 inches between the apples resulted mainly in a reduction of the culls. The other extreme, 9 to 10 inches in some cases, gave scarcely better results than the medium distance of 6 to 7 inches. Probably different distances will have to be adopted for different varieties.

To meet the objection that thinning is prohibitive because of the cost I offer the following figures: The actual cost of thinning trees 20 years old was 25.4 cents per tree, reckoning the labor at 20 cents an hour. It cost only 14.7 cents per tree to thin a 10-year-old tree. Some heavily laden York Imperial and Ben Davis trees 18 or 20 years of age cost 37½ cents per tree. These trees yielded from three to four barrels per tree, so that the cost of thinning was not more than 10 cents per barrel. The average of all these trees was about 11 bushels. There is no question but that it pays well to thin. When the argument is made that it is like picking apples twice, we answer that it

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costs no more to pick these apples in June than it does to pick them at harvest time. The only rule that we can give regarding amount to remove is to thin all that you think ought to come off and then go over the tree and take as many more. One rarely takes off enough. We have tried using clippers and picking off the fruit by hand. It takes too much time to use the clippers. On some large trees the cost with clippers ran 58 cents per tree, while by hand the same trees were thinned at the cost of 43⅓ cents. Our men do not destroy any more fruit suprs when thinning by hand than with clippers. It is more difficult to thin the York Imperial than the Ben Davis, because the former grow in clusters with short stems. With the Ben Davis you get hold of the stem without disturbing the fruit. Thinning is not really a big proposition, although it looks to be, and it pays.

THINNING PEACHES.

Peaches are not grown in West Virginia as extensively as are apples. Your peach industry exceeds your apple industry in Delaware. I do not believe you can afford to raise peaches without thinning. It is better to thin soon after the June drop, but one grower in our State with a big orchard put off his thinning until August 20, three weeks before it was time to pick the fruit, and yet it paid immensely. Most of the peaches where they were thinned went into Georgia carriers; those not thinned went into the ordinary three-eighths Delaware peach basket. It is common practice with many growers to pack their best fruit in carriers and their inferior grades in Delawares. One notable thing about thinning peaches is that the fruit takes on a much better color. In every case we got the best color in the blocks where the peaches were thinned. We gave the sun a chance to get at the fruit.

Mr. Soper—How far apart did you leave the peaches on the twig?

Professor Alderman—From 5 to 6 inches.

Without spending any more time on this part of the subject, I want to assure you that it pays us in West Virginia to thin our peaches.

THE USE OF COMMERCIAL FERTILIZER FOR PEACHES.

I believe that many of our West Virginia fruit growers are losing a great deal of money in the way they use commercial fertilizers. I am not opposed to the use of commercial fertilizers, but deplore loss occurred because the fertilizers are not used right. Our soil conditions are different from yours, and perhaps the fertilizer experiments that we have been running were carried on under different conditions from those you have here, and our results may not apply to your orchards. I am inclined to think, however, that they will apply in a general way to your conditions. Other experiments in Delaware, Ohio, New Jersey, and Pennsylvania with peaches and apples bear out the work in West Virginia and point in one direction. There is apparently one thing above all others that we need on our orchards, nitrogen. Unfortunately this is the msot expensive element of the fertilizer we buy.

Several years ago the chemist of the New Jersey Experiment Station and

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lyzed peach trees at various stages of their growth and bearing. In this way he found out what the tree was made of. He found that when trees were planted 18 feet apart each way they would remove each year from the soil 49.2 pounds of nitrogen, 13.7 pounds of phosphoric acid, and 30.7 pounds of potash. The New York chemists became interested and made similar analysis. Their results showed that their trees, which were larger and heavier croppers than those in New Jersey, removed 83.1 pounds of nitrogen, 19.9 pounds of phosphoric acid, and 79.8 pounds of potash when planted 18 feet apart.

Mr. Roberts—Would not the New Jersey trees have shown the same result if these fertilizing elements had been present in the soil in sufficient quantities?

Professor Alderman—Perhaps that is true. I do not know. A peach tree does not always respond to an additional amount of some plant foods. Our soil is about the same as some of your soil in New Jersey. It is poor and thin and contains very little plant food, and still we do not need to apply a large amount of phosphoric acid. I think that the amount of nitrogen, phosphoric acid, and potash found in the tree is a good indication of what the tree requires. The lesson, then, which may be derived from the analyist is that large amounts of nitrogen and potash are required. But most soils contain goodly amounts of potash. Then theoretically nitrogen is the food most likely needed. Let us see how experiment bears out hypothesis.

The peach tree, like other plants, gets its food from the soil through its roots. This plant food passes up through the body of the tree to the leaves, where it is assimilated, and then passes back to form all parts of the tree. The leaves play the part of the stomach and lungs of the tree. They are, therefore, a most important organ. If we take away the lungs and stomach we take away the life of the tree. We found that the fertilizer affected the character of the leaves. A glance at the chart will show that the plat to which nitrogen had been applied bore more and larger leaves, thereby increasing the total leaf area from three to four times. This increase in leaf area makes possible a greater assimilation of plant food and is important in interpreting results.

EFFECT OF FERTILIZERS UPON LEAF AREA OF PEACH TREE.

	Area of leaf sq. in.	Average number leaves per tree.	Leaf area sq. ft.
Nitrogen and phosphoric acid	4.28	25,424	755.6
Nitrogen and potash (muriate)	4.26	24,808	734.4
Complete	4.06	23,208	654.3
Check	2.63	8,768	160.1
Potash (muriate) and phosphoric acid	2.89	10,596	212.6
Complete	4.12	29,536	845.0
Complete with potash doubled	4.39	32,368	986.7
Complete with potash tripled	4.26	22,648	670.0
Lime	3.26	14,172	320.8

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The second effect of the fertilizer was apparent in the annual growth of the tree in the various plats. Inasmuch as the fruit buds are borne upon the new wood alone it is important that a good annual growth be secured. The following table illustrates the behavior of both young and bearing trees. It will be noted that the plats receiving nitrogen have made a terminal growth double the length of those receiving no nitrogen, while no very appreciable difference can be detected between the check plats and those receiving potash and acid phosphate alone.

EFFECT OF FERTILIZERS UPON TERMINAL GROWTH.

From a Four-Year Average.

	Bearing trees.	Young trees.
Nitrogen and phosphoric acid	16.1 inch	50.2 inch
Nitrogen and potash	14.47 inch	43.6 inch
Complete	15 inch	47.3 inch
Check	7.28 inch	34.6 inch
Potash and phosphoric acid	8.16 inch	29.7 inch
Complete	14.4 inch	
Complete with potash doubled	15.59 inch	
Complete with potash tripled	15 inch	
Lime	7.84 inch	

Without spending any more time upon tree characters we will proceed to the fruit production. The summary covering four years and three crops (1912 crop destroyed by a freeze in May) shows a close correlation between the use of nitrogen and crop production. The plats having nitrogen have outyielded the others not quite two to one.

EFFECT OF FERTILIZER UPON YIELD OF FRUIT PER TREE.

	1911 lbs.	1913 lbs.	1914 lbs.	Average lbs.
Nitrogen and phosphoric acid	41.88	74.08	93.9	69.95
Nitrogen and potash	47.3	81.29	87.2	71.93
Complete	48.49	64.79	92.9	72.06
Check	46.81	51.32	50.3	49.48
Potash and phosphoric acid	45.69	46.86	34.7	42.42
Complete	51.63	90.76	104.5	82.29
Complete with potash doubled	52.38	99.67	94.2	82.08
Complete with potash tripled	49.09	107.97	90.7	82.59
Lime	44.13	58.53	79.8	60.82

It is often said that potash paints the fruit and puts on a brilliant color. We find that sunlight paints the fruit, and the high color of peaches from the

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check plats and those having no nitrogen is due to the action of the sun in their foliage rather than to the action of any chemical.

Mr. Huston—It is important to give a proper interpretation to the results of any fertilizer experiment. When nitrate of soda is applied to the soil some of the potash in the soil is made available, so that applying additional potash at that time might not appear to give any result, but if continued without potash the supply in the soil may not continue to be available, and then potash will be necessary. In careful experiments no nitrate of soda or acid phosphate should be used.

Professor Alderman—Your contention may be scientifically correct, yet the practical bearing of these results can hardly be questioned. The fruit grower buys nitrate of soda, muriate of potash (or sulphate of potash), and acid phosphate. The matter which directly concerns him is "What will be the result when these are applied?" We applied the three materials and I have given you our results. As a matter of fact, potash has in several instances proven to be of no value and has even worked injury to peach trees in West Virginia. Professor Corbett repeatedly killed young trees with two pounds of muriate of potash and injured them with much smaller amounts.

Question—Did you have a paying peach crop last year?

Professor Alderman—Yes and no. We handled a record-breaking crop for the State, but the prices were low and profits small.

Mr. Roberts—It takes longer to get results from potash than from nitrate of soda.

Professor Alderman—We have waited four years and have seen no beneficial results yet.

Dr. Murray—It appears from your results that very much more depends upon the fertilizer than the season.

Professor Alderman—Yes, that is true except in case of severe cold or frost.

Mr. Slaymaker—Does the use of nitrogen make any difference in the color?

Professor Alderman—Yes; nitrogen tends to reduce the color but increases the size of the fruit.

Question—How old are these trees?

Professor Alderman—Eleven years of age.

Question—What effect did nitrogen have upon the season of ripening?

Professor Alderman—It delayed ripening very markedly. I am confident that with the judicious application of nitrate of soda the ripening season of mid-season peaches like Elberta could be delayed ten days, and earlies sorts, as Carman, at least a week.

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PEACH CULTURE.

PROF. M. A. BLAKE.

I can not help sympathizing with you on the weather that you are having. When the New Jersey Society met early in December on the college farm, at New Brunswick, we were handicapped by the same kind of weather.

I will discuss this afternoon some general facts in connection with the culture of peaches. The most important thing in considering the subject of peach growing is the fact that our systems of marketing are changing and the time is past when the farmer can grow peach trees in the old way, market the fruit in the old way, and expect to get much profit from the business. We are rapidly approaching a point when to succeed a man must be prepared to supply the market quite regularly and in sufficient quantities to make his fruit known. I am considering the business upon a rather large scale, for the small grower in a limited way may be able to handle all of his fruit, locally, but the men who are going into the business on a large scale must have a broad outlook. In a season like the last one, the man who depends upon a small local market is likely to find that he is in the position of having a great quantity of fruit placed on that market in competition with him and with no other definite outlet for his fruit in sight. So I take up the question with these ideas in mind.

There is first the soil type for commercial peach production. There is a marked difference in the rate of growth and rate of maturity of peach trees on different soil types in different parts of the country. Experiments in New Jersey show that we have quite different soil types in different parts of the State. I will say roughly that the trees in the southern part of the State have greatly outgrown those in the central part of the State. Trees from the same nursery make a better growth and set fruit earlier in southern New Jersey than in the central and northern part. Around Vineland some growers have secured four baskets to the tree of the Carman variety the third summer after planting, but such records are not possible in the mountains. It is important that the soil be well drained and open. The sandy loams and the gravelly loams are very satisfactory types. The elevation is important and the orchard should be located somewhat above the surrounding land level. A close study of this problem indicates that this is just as importnat on the sandy loams in a level country as it is in the rolling country. At Vineland last spring when the temperature fell to 6 degrees below zero on March 21, orchards having an elevation of 100 feet had heavy crops, while those having an elevation of from 85 to 90 feet did not produce a peach. These differences have been observed from year to year often on our quite level lands. It is possible to work up a map for

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any section to show what is the best elevation for peaches in that district. In Hunterdon County, N. J., a man should be safe from much frost injury if he is 700 feet or over above sea level, and there is much more likelihood of his securing a crop annually. With 700 to 900 feet elevation men have had full crops, while orchards only 300 feet above sea level did not bear fruit. This applies to injury in midwinter as well as in the spring.

As to varieties, I think something needs to be said upon this question whenever we are considering the matter commercially. We now need to consider the variety question from a different standpoint than it was considered some years ago. Too often a new variety was considered commercial on the character of the fruit. We have examples of such varieties as Triumph being planted because it was a yellow peach ripening about the time of Carman. Too many varieties have also been planted on the basis of their performance recommendation in a favorable season. The variety for commercial purposes should be judged on its performance in an unfavorable season. Its popularity commercially should depend upon its ability to meet the requirements of shipping also. Our variety list is too long. I do not put any more blame upon the nurseryman than the grower. It is obvious, however, that as we come to consider this marketing question in a more intensive manner that we must have fewer varieties. Too many varieties from one district is detrimental to the business. In any co-operative movement the more uniform the car loads of fruit the better the results. Who wants to buy a car load made up of a dozen varieties? It is true that in certain localities a certain variety may do well, while in another locality it fails to succeed. The list can be reduced, however, so that each locality shall have a short list. Somebody ought to say a word, too, as to the naming of varieties. I do not criticise the fact as it stands today, but it seems to me that it is very bad practice to have names too closely alike. We have, for example, Early Elberta, June Elberta, Elberta, October Elberta, and Late Elberta, and I can not see how people can fail to get the varieties mixed in their minds and their orchards to some extent. If we have the words early, late, June, or October on a small wooden label, these words may be broken off and then how is the orchard owner to tell what kind he has. If the words are abbreviated to letters and written by hand, it might be difficult to tell a J from an L sometimes. I do not criticise the quality or value of these varieties, but why not give each one a definite name and avoid confusion. This trouble if confusion in varieties is one of the reasons that an orchard may bring reduced profits. The varieties said to be most profitable in New Jersey about 1899 were Mountain Rose, Reeves Favorite, Early and Late Crawford. But times have changed, and two years ago in a survey growers said that Elberta, Belle of Georgia, Carman, and other varieties were now more profitable. In other words, we are not satisfied with the hardiness of these old varieties and they must make way for newer and hardier ones.

As station officials we try to give advice that can be followed without getting the grower into trouble, but Champion got me into trouble this year.

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A man at Vineland was receiving only fair prices in New York for good Champion. I suggested that he send a shipment to Boston. His fruit was sprayed and picked and packed in the proper manner, but the highest price he could get in Boston was $1 and $1.25 per crate. We had a man in Boston, so we knew the commission man did his part. Champion is a very poor shipper. One might expect that it would carry from Vineland to Boston under refrigeration, but when the buyers came along to examine the fruit at the commission house and found that peaches in these crates had commenced to decay they either made a low bid or passed them by. When Champion was pre-cooled before they were shipped, however, they brought $1.75. The time is soon coming when the commercial variety must meet the standard for distant shipment. One can not depend upon a local market, at least the large growers can not. I believe such varieties as Triumph and Mayflower are not worth the consideration of the commercial grower. Carman, Lola, Hiley, Belle of Georgia, and Elberta are our best varieties, and, to a limited extent, Greensboro, Frances, and Iron Mountain. In a neighborhood where orchards of 200 or 500 trees are the rule the growing of a great list of varieties will hinder co-operation in marketing. It is easier to manage the business with a small number. New varieties must, of course, be tested out before we can determine their worth; but one should not plunge into the purchase of these on a large scale before he is certain of their worth in his locality.

The distance between trees in planting is a very important matter, not so much from the standpoint of working and spraying the orchard and of the plant food in the soil as from the moisture standpoint. One of our orchards is set 15 by 15 feet to test the close planting method. In the past it has been said that trees planted at this distance are more profitable because they can be kept pruned down, will be easier to spray, and the net result will be more money. We are trying out this method in comparison with planting at liberal distances. The most important thing to consider in connection with close planting is the danger of not having water enough. An orchard in full foliage will use an inch of rain in a very short time. After such a rainfall at Vineland our close planted orchard needs rain again in a very few days. All of you have noticed where trees are so close together that the branches touch that it is almost impossible to grow cover crops, and perhaps you have supposed that it was a question of shade or the lack of plant food, but it is rather a question of moisture. It is certain also that the close planting method will require much heavier fertilization. If trees are planted very close you may have small fruit in spite of tillage, spraying, fertilizing, and pruning. When a tree is taken out of a close planted orchard you will notice how rapidly trees surrounding this spot will increase their growth; that they are even larger on the one side next to the removed tree than on the other. This is because they get more moisture. On starved, slow growing trees all the buds will come into bloom about the same time in the spring, and if there is a frost all will be killed, while on larger and more free growing trees the blooming period

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is more extended, covering a matter of several days, and a difference of two or three days may make the difference between a fair crop and a crop failure. With close planting you will often fail to get a cover crop also. We are satisfied that to get the best results in New Jersey we should plant about 20 by 20 feet. The most successful commercial growers are now planting their orchards with a good distance between the trees. It is not possible to secure an average of twelve or fifteen baskets of peaches per tree when they are planted as close of 15 feet apart each way. It is impossible to get big yields unless you grow big trees. Sometimes the early varieties will get along fairly well at close distances, but as the late varieties come on the effect of a short moisture supply, especially on our sandy soils, is very noticeable.

I will not go into the fertilizer question from a technical standpoint. We have found that nitrogen is the most important element of the three common forms of plant food. This is true on sandy soils and on mountain soils. The results of investigations check up very closely in each section. The soils in Hunterdon County are very rich in potash, while in other parts of the State they are poor in potash, and yet the results in the northern part of the State are comparable with those in the southern part, in that they show that nitrogen must be applied. For the average soil about 150 pounds of nitrate of soda per acre should be applied every year after the trees come into full bearing. A bearing orchard requires much more nitrogen than young trees. Young trees might grow very well where a bearing orchard would starve. Of course some potash and phosphoric acid is necessary, but nitrogen is demanded more than either one of these.

Cultivation should be continued well into the middle of the summer. The time to stop cultivation should be varied according to the condition of the soil, season, and varieties. If you have early varieties and the season is moist, you can stop early. If the season is dry you must continue the cultivation, and especially if the varieties are late ones you must conserve the moisture until the fruit is matured. Smock and Late Elberta may shrivel up in dry seasons if cultivation is not continued late into the season. So the only rule one can give is to cultivate according to the variety and according to the season, but certainly maintain cultivation as long as it is needed.

There has been a good deal of discussion about pruning young trees. Some favor cutting back the young trees almost to stubs the first year after setting the trees. My suggestion would be not to do it. Actual dehorning of young trees is a great mistake. Our extensive pruning experiments have been carried on for three seasons and we have shown that you can cut a tree too severely. There is one advantage in the moderate pruning back of trees that may well be considered in places where the trees may be frequently covered with ice or snow. We had an unusual demonstration of this in Hunterdon County two weeks ago. One man had cut back the tips of the branches on one-half of his orchard and had not pruned the other half. A storm came and the trees were heavily laden with snow and ice. The pruned half of the

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orchard showed only one or two badly broken trees; the other half was severely broken.

It is necessary to spray annually to control leaf curl and the scale. For a time growers were considerably puzzled over the question of leaf curl because they controlled it with lime sulphur in some seasons and failed in others. It was found that the trees must be sprayed before the leaf buds begin to open, as that gives the disease a chance to attack the leaves. One thorough spraying with the lime-sulphur solution before the leaf buds start will prevent it. We can not omit summer spraying where scab and brown rot are serious. We use the self-boiled lime sulphur to control these troubles. I think the time is very close at hand when some commercial brand will be prepared that can safely be used on the foliage even in combination with lead. From results noted in the last year or two it seems to be dangerous to use arsenate of lead on the peach foliage in combination with sulphur alone. The question of controlling curculio may not be serious in all orchards. Our experience is that when the set of fruit is light the curculio may cause a good deal of damage and it is safer to use the arsenate of lead in the first spraying at least.

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MARKETING PEACHES.

PROF. M. A. BLAKE, Horticulturist of New Jersey.

This afternoon I talked to you about peach culture, giving particular attention to the production of peaches, about the proper tillage, pruning, spraying, and other practical matters. It is quite as important to market a crop properly as to give it the proper culture, and I will discuss a few points about marketing peaches. We must increase our crops, but whether the crops are large or small they must be sold at a profit if we are to continue in the business of growing them. We must regulate the sale of our production if we are to be successful, and we must study the markets and find out what they demand, then we must use our best efforts to meet that demand. The old way of bringing buyers to our local shipping points and selling fruit for whatever price they may offer is not always a profitable way of marketing our fruit. The farmer must adopt the methods of the successful manufacturer if he is to get the best prices for his goods. The large manufacturer organizes to secure customers and furnishes them with the products that they need and he systematizes his business and standardizes his product. The fruit grower must do the same thing. He must standardize his product and have a large quantity to sell if he is to get the best prices. The very small farmer or fruit grower will have difficulty to sell his crop in a wholesale market unless he can co-operate with other small growers, who together shall agree to a standard and shall then grow and pack their goods according to this standard, and unite in a co-operative way to sell their crop. It is necessary to have a sufficient amount of fruit to attract buyers and to establish a brand or grade that can be sold in wholesale lots in the same way that the large manufacturer makes a market for his own brand of goods.

To take up this matter of marketing more in detail, one should begin to plan for the marketing of the crop early in the year. As soon as the extent of the June drop can be noted one can begin to estimate the size of the crop and the question of a market should be immediately considered. If the grower is finally forced to send his fruit to a wholesale market after he had prepared to sell it in a local market, he will have difficulty in making the proper arrangements to dispose of his fruit, and he may be forced to sell it at the railroad station and take whatever price is offered. Such a man does not look up the shipping problem ahead of the harvesting of his crop, and so he does not know where to ship when forced to, and he makes haphazard shipments with very unsatisfactory results. A man should look for more than one door through which to send his fruit to market.

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There is much in the package and packing. Some markets may pay more for peaches in 16-quart baskets, others may pay very much more for Georgia carriers. It depends upon the circumstances and the market. It surely is a wrong policy to put small, inferior fruit in Georgia carriers. For such fruit the 16-quart basket may be more satisfactory. Sell the smaller locally if you can. Some markets may demand the five-eighths basket. I believe it will injure the business to have both the 16-quart and the five-eighths basket in the same market. Whatever the form they should be uniform in size. Where fruit has to be shipped by rail any distance, it is best to ship the high quality grade in the Georgia carrier. It is a little slow work at first to pack fruit in the Georgia carrier, because the method is not generally understood. There are a lot of freak packs that the grower should not bother with. Two styles of pack will handle successfully any crop of peaches of ordinary size. Rapid packing depends upon several things. The way the crop is handled in the orchard before packing is important. One should organize a field force so that the men who pick the fruit will do it properly. The fruit should be picked at exactly the right stage, not too green and not too soft, but always of a uniform maturity. The fruit should be put in dry. Every fruit that is ready to pick on a certain day should be picked. Maturity should be judged by color, and not by squeezing it to determine whether it is ripe enough. If a man will not learn how to pick the fruit right, put him to doing something else. As soon as the fruit is picked it should be delivered promptly to the packing house. The best packing house is long and narrow, so that no unnecessary carrying of the fruit from the wagons to the tables is required. The packer stands facing the table which holds the Georgia carrier on a shelf which supports the crate lengthwise with the table and level with the top of the table. A supply of empty crates is placed behind the packer within easy reach, so that when one crate is filled it can be taken away and the packer easily reaches a crate behind him. There should be a shelf about 20 inches above the center of this table, upon which to put the three top tills and the central slat of each crate while the bottom tills are being packed. All peaches from 6¾ to 7½ inches in circumference will pack 2–2, 3 layers. All others up to 8½ inches in circumference will pack 2–1, 3 layers in each till.

Each grower should have a distinctive label. The small grower will not secure the full advantage of this in the wholesale market, which is another reason why such growers should co-operate and have some arrangement by which they may all put up the same grade of fruit in the same manner and have a label that identifies all of their fruit. One man might not be able to ship a solid car load of Belles, for example, but several growers in a district might combine to load cars with a uniform grade of Belles, Elbertas, or any other variety. They would find a more satisfactory market for such shipments than for car load made up of individual lots of many varieties.

Grading is also very important. The size of peaches that make the 2–2 pack should not be mixed with those that make the 2–1 pack. If one packer

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grades his fruit uniformly and the man beside him does not, so that when the shipment reaches the market a buyer sees some crates containing peaches of uniform size and other peaches of different sizes, he will not spend time to see how many crates in the lot are well packed and how many are poorly packed, but will either offer a low price for the lot or pass the shipment by entirely. Such packing is bad business.

There should be spaces between the crates when they are shipped in refrigerator cars. With seven crates spaced across the width of a car 2-inch air spaces are allowed. Wooden strips 8 feet long and five-eighths to three-fourths inches square should be nailed across the ends of each row of crates across the car to make the whole rigid, and so each crate will be held in place.

In making car-load shipments of peaches from Vineland to Boston 3 tons of ice was required to fill the bunkers of each car at point of shipment. and 2,000 to 2,300 pounds per car was added at Jersey City.

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PEACH CULTURE ON THE PENINSULA.

HON. ORLANDO HARRISON, Berlin, Md.

The subject assigned me is peach growing, the part that you are interested in—does it pay? I will try to tell you in a plain, practical way how we made our peach orchards pay in the seasons of 1913 and 1914. We also have a good set of peach buds for 1915.

Pruning.—The first thing is pruning, and January is the month to begin it. We cut back our peach trees when planted to from 12 to 18 inches. Our one and two year peach trees are cut back one-quarter to one-third of the previous year's growth to make a sturdy tree, and a three-year-old tree we cut out all the dead wood and shorten ends of limbs to keep the trees near the ground and to save the expense of picking the fruit. In orchards four to nine years of age one must use good judgment in pruning. No set rule is safe, but you must keep out all dead limbs. Prospects for fruit depend upon the variety. First we determine what we are pruning for—wood growth or for fruit—and govern accordingly. Do not prune the small live twigs near the trunk when the trees are three years of age, for that is where you get the first fruit.

Spraying.—Spray early in March with concentrated lime-sulphur, 1 to 9.

Fertilizing.—About March 5 to 10 we use a mixture made up of 500 pounds of dissolved bone, 500 pounds of kainit, 500 pounds of rock, and 500 pounds of muriate of potash, applying 500 pounds per acre broadcast.

Cultivation.—Disc harrow, started March 10 to 20, followed once each week with a grape cultivator, crossing each way, then diagonal in order to break every foot of top crust. When the dry weather sets in the cultivator must be kept going oftener. We continue the cultivation regularly until about July 10, or until the crop is safe.

Peach Borer.—During the growing season the trees are hoed around about three times and the borers cleaned out. This is the worst enemy of the peach tree. In many orchards said to be affected with yellows you will find the real trouble to be borers. Apply the knife or wire and free the borers by picking them out. No sign of yellows has ever appeared in our orchards. Wood ashes is a good form of potash to apply around the trees when the earth has been pulled away. Also concentrated lime-sulphur, 1 to 3 or 5, or the waste sulphur

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and lime in making self-boiled mixture should be applied around the trunks and the ground. It will help to keep the borers out.

Spraying for Curculio and Brown Rot.—You should start one week before it is really needed, or generally recommended, and even then you are often too late for best results. If you are too early, you can go after it again. If you are too late, you will not save that season what you have lost by delay. We spray before the blossoms open with 2 pounds of lime, 2 pounds of arsenate of lead, and 50 gallons of water. Seven days later, when the blossoms are full, or dropping, we use 8 pounds of lime, 8 pounds of sulphur, and 2 pounds of arsenate of lead. We repeat this ten days later. When the peaches are the size of hulled walnuts, or larger, we repeat the same spray, except that we omit the arsenate of lead for fear of injuring the fruit. With these sprayings you can control the brown rot. This brings you to July 1 or 10. It should be remembered that varieties running from Crawford Late, and later varieties, can be sprayed later than the earlier varieties.

Packages.—We use the Georgia carrier for all the well-colored, select fruit. We think the Georgia carrier superior to any other package.

Varieties.—Our orchard of one hundred acres, from four to nine years of age, consists of 1,665 Carman, 500 Champion, 500 Belle of Georgia, 1,300 Ray, 1,000 Crawford Late, and 4,500 Elberta, which gives us peaches four months, from June 15 to October 15.

Marketing.—In July I visited a number of orchards in Maryland and other States and found that the prospect for a full peach crop was sure, especially for Baltimore and Philadelphia markets. I then spent two weeks among the commission men of Boston, New York, and other cities to determine what was wanted by their trade. I found poor, and even medium, peaches for sale, but ripe, highly colored, well packed in Georgia carriers were selling at a good price, even on a full market. Returning home I determined to see that our peaches were left on the trees until they were ripe, and to pack them in Georgia carriers, full size, and with cover pad to keep them from bruising on the top layer.

Picking Peaches.—More care was exercised this season than in the past to see that the fruit was full grown and ripe before picking, and we took greater care not to bruise the fruit. The trees were loaded to the ground, which prevented our getting a wagon in the orchards, and we hauled the fruit on a sled to the packing house.

Packing.—Three-two-tier and filled the crates full, with a raise of one-half inch on each end of the crate, which will make a bulge of 2 inches in the center when the lid goes on. We secured an expert Georgia packer, so that we could start our packers right. They caught the idea and carried it through the season.

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Refrigerator Cars.—We try to have our cars iced, ventilated, and cleaned at least twelve hours before loading; twenty-four hours is better. The Pennsylvania railroad's new refrigerator cars are far superior to the old ones, although the icing charge is greater, the cost ranging from $30 to $38 per car. By having the peaches packed full carrier we use a strip between the crates of 2 by 2 inches, securely nailed. You should see that the bunkers are well filled with ice before the cars roll.

Ripening of Varieties.—Starting with Carman, the trees were too full and were poor color, and we sold the first twelve cars for from $1 to $1.10 per carrier, f. o. b. Berlin. Champion sold in Newark, N. J., for $2 to $2.25 per carrier. Belle of Georgia and Ray, picked about the same time, were placed on the Boston market and sold for $3.25 per carrier. We left the Elbertas on the trees until they attained a large size. We picked eleven cars one week, August 16 to 26, selling from $3 to $3.50 per carrier. In Boston four cars were sold at $2.80 per carrier, f. o. b. Berlin. Crawford Late were left too thick on the trees, and by adding 5 pounds of nitrate of soda, and the late rain, in addition to the fertilizer used in the early season, caused the quality of the peach to be injured, and the fruit did not color well. This showed that an excess of nitrate of soda and rain will affect the size of the peach at the expense of flavor and color. This variety sold for from $1 to $2 per carrier. In our test orchard we had several promising old varieties fruited and we find that by the use of self-boiled lime-sulphur the list of peaches can cover a long season with profit. Among the most valuable ones are Slappy, an early yellow peach, but shy bearer; Mamie Ross, medium season, red blush and heavy bearer; Fox Seedling, white flesh, red blush, and late; Shipley's Late Red, white flesh, red blush, late. The Chinese strains are usually best.

Care was used in caring for the peaches. As fast as they were packed they were hauled to refrigerator cars under cover, keeping them from the rays of the sun as far as possible. Car doors were kept closed except when loading, men working by lanterns.

Labeling Crates.—We used labels only on the select grades. Soft peaches were sold near home. There is one feature of the peach industry that should be encouraged by this society, and that is to get our canning people all over the Peninsula to use all the No. 2's and soft peaches for pie fruit. One canner paid 50 cents per bushel for all such peaches in West Virginia and it made good for him. We must keep the culls out of the market.

Peach growing will pay if you are willing to work and to teach your boys to work, or to see that the other fellow works and you give it your personal attention. It will pay greater and quicker returns than any other tree fruit. From the 100 acres that I have described in 1913 we sold 60 cars of peaches, netting over $25,000. In 1914 we shipped 41 cars, netting over $18,000, a total of $43,000 net from 100 acres in two years.

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Summing up the situation of how we grew and marketed our peach crop of 1914—we had the right kind of soil, well drained, a sandy loam; pruned properly; had the right varieties; gave thorough cultivation and proper fertilizing; spraying at the right time, freely, and with the right materials; left the fruit on the trees until ripe; properly and carefully packed, full and good from top to bottom with only the best fruit, and placed them on a market where a high grade of fruit was wanted.

Mr. Shallcross—Do you put a special strip in to make the bulge?

Mr. Harrison—Yes, we do; and by the time the fruit gets to market it is all right; they have settled down. It is absolutely necessary to put in this strip, 2 by 2 inches.

Question—How many a day do you put up?

Mr. Harrison—From 50 to 80. Our packers do more after they have had a few days' experience. Men can not do the packing as quickly nor as well as women, but we aim to do the packing the best way and not to get the most done.

Professor Temple—Have you tried thinning to increase the fancy fruit?

Mr. Harrison—Yes, but we have not thinned as thoroughly as we should. Our Carman have not been properly thinned; also Crawford Late. They were both too thick and we did not get a good price for them. Elbertas thin themselves. There is another point about thinning. We do not want to thin too much, but just enough to keep them of uniform size. There is a limit to the thinning business and one must use judgment in doing it. It is safer to thin several times. Of course you have first got to have the fruit on the trees. My brother is a sticker for leaving the fruit on the trees.

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PEACH CULTURE.

C. A. McCUE, Horticulturist, Delaware Experiment Station.

For the past fifteen years peach culture on the Peninsula has been steadily upon the decline. The centers of peach growings have been steadily retreating southward. In the 70's the industry was centered about St. George's. Next the great peach-growing section was about Smyrna, and finally about Wyoming, south of Dover. During the past ten years thousands of trees have been pulled out and destroyed. Today it is hard to find a peach orchard in regions that only a decade or so ago were famous for their peaches. The huckster still cries his "Delaware Peaches" upon the streets of our large cities; but alas, little, if any. of his fruit ever saw the State of Delaware. More likely it came from New York, Connecticut, Colorado, or even the sun-kissed hills of California.

The decline in peach production is with us and it is for us to try and ascertain the cause of the decline.

Briefly summarized, these causes are:

1. Poor orchard cultivation.
2. Starvation.
3. Borers.
4. San Jose Scale.
5. Yellows and Little Peach.
6. Improper spraying.
7. Poor pruning methods.
8. Poor grading and packing.

In this short talk it is not my intention to go into all the phases of up-to-date peach orchard management. I wish to confine myself largely to question of plant food for the peach ordchard.

In one of our oldest peach-growing regions in Delaware the farmers have claimed that it was no longer possible to grow a profitable peach orchard, and some of them importuned the Experiment Station to find out, if possible, the cause for their inability to grow good peach orchards. One of their favorite theories was that there was some element lacking in the soil that was necessary for peaches.

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In order to test out this theory the Delaware Station, after some search, finally located a young orchard in that region and secured the owner's consent to use it for experimental and demonstration purposes. The orchard secured comprises about 16 acres of 2-year-old trees. At the time we first saw the orchard it was a sorry-looking proposition. The trees were small, many stunted, some diseased, and some were missing. This was the third peach orchard that had been upon that particular field. The other two had lasted for a reasonable length of time, grown to maturity, given their profit and passed on to the happy hunting ground of faithful peach trees. If there was anything in the theory of cropping the land to peaches so long, that some necessary element had been exhausted, here seemed the place to prove it. Accordingly the orchard was divided into two parts and the Station assumed the direction of the management of about 8 acres, the tenant upon the farm promising to do everything within reason that was asked of him. I must pause here to say that he carried out his end of the bargain faithfully and much of the success of the work is due to his sympathetic attitude, willingness, and promptness in doing all the orchard operations that were asked of him.

The 8 acres were divided into eight 1-acre plots and each plot received different fertilizer treatments, while the cultural spray treatments and cover crop was the same for all blocks. No attempt was made to measure the crop produced upon the blocks; but all of the 8 acres grew magnificently and produced abundantly. The most striking feature of the results was, however, the response of the block which did not receive the thorough cultivation that the other blocks did. While it did not yield as heavily as some of the fertilized blocks, it proved conclusively that one of the reasons that peaches had failed in that locality was lack of proper cultivation. True, this particular orchard responded nobly to pertilizer applications, yet there was no one element of plant food seriously lacking in the soil.

Reasoning from the behavior of this orchard and my observations in other orchards throughout the State, I think that I can truthfully say that no one peach grower in five in Delaware understands the importance of cultivation in the peach orchard.

I think that I can truthfully say, without danger of being successfully proven in the wrong, that 75 per cent of the peach orchards of Delaware are slowly starving to death and that slow orchard starvation is as much the cause of the decline of the peach industry in this State as any one other cause.

During the past seven years at the Delaware Experimental Station at Newark we have been experimenting with commercial fertilizers in a peach orchard. Many of you have seen the orchard and I think I can say without egotism that there is no handsomer orchard in the State. In the spring of 1908, much to the disgust and amusement of the neighboring farmers, we set out 600 Elberta peach trees. The land was in a run-down condition and the type of soil was not especially adapted to peach growing. This lot of trees was divided into 24 equal blocks of 25 trees each and a set of fertilizer experi-

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ments were started. The records have all been computed from the nine center trees of each block. The fruit has been carefully weighed each year. One corner of the orchard is low and has suffered from "wet feet" and frost, hence the results that I will show for certain blocks, especially blocks 13 and 19, do not mean much. Block 6 is also somewhat unfortunately located and blocks 14 and 20 have suffered to some extent from frost.

I will now show the table in order that the results may be before you so that you can easily follow the references.

TABLE I.

Yield of Peaches at Delaware Experiment Station. Orchard 7 Years Old. Fertilizers Applied Yearly.

Plot	Treatment	Yield in Baskets Per Acre. 1912.	1913.	1914.	Total.
1	K	348.0	236.0	180.4	764.4
2	Check	432.8	96.5	313.2	842.5
3	K_2	708.6	333.5	523.8	1,565.9
4	P	410.2	82.7	469.8	962.7
5	Check	199.5	78.5	225.7	503.7
6	P_2	53.3	00.0*	771.2	824.5
7	Check	18.4	43.2	559.4	622.0
8	K. P	122.3	349.0	368.3	839.6
9	N	171.8	179.2	1,859.8	2,210.8
10	Check	244.2	80.9	703.1	1,028.2
11	NK	471.2	135.6	2,144.9	2,751.7
12	NP	269.8	.2	1,211.8	1,481.8
13	K_2P	7.9	206.5	710.6	925.0
14	KNP	18.3	231.4	740.9	990.6
15	KN_2P	206.0	458.9	1,348.9	2,013.8
16	N_2K	526.0	331.6	2,095.2	2,952.8
17	N_2P	556.5	106.8	1,782.0	2,445.3
18	Check	381.8	1.2	432.0	815.0
19	NK_2P	57.6	53.0	137.2	247.8
20	Check	6.8	34.8	252.7	294.3
21	NKP_2	80.3	520.1	977.4	1,577.8
22	NK_2P	324.3	478.8	1,226.9	2,030.0
23	N_2KP	551.1	183.6	1,971.4	2,706.1
24	NKP_2	244.4	21.6	1,671.4	1,937.4

*Killed by spring frost.

The nitrogen applied has always been in the form of nitrate of soda; the potash as muriate of potash and the phosphoric acid as acid phosphate. The

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unit of applications has in all cases been 50 pounds of the actual element per acre. In the table N always means 50 pounds of actual nitrogen, K means 50 pounds of actual available potash (K_2O), and P means 50 pounds of actual available phosphoric acid (P_2O_5). Fifty pounds of nitrogen is equivalent to approximately 333⅓ pounds of nitrate of soda, N_2 twice that amount, and N_3 three times 333⅓, or 1,000 pounds of nitrate of soda. Fifty pounds of potash is equivalent to 100 pounds of muriate of potash and 50 pounds of phosphoric acid is equivalent to about 350 pounds of acid phosphate.

With this explanation in mind, let us examine the table in some detail. The most striking fact shown is the importance of nitrogen in fruit production. The old belief that a peach tree needs but little nitrogen is effectually disproven. Take, for instance, plot 9, which has never received any potash or phosphoric acid, but has had seven annual applications of 333 pounds per acre of nitrate of soda. The past year it yielded at a rate of about 18 baskets of peaches per tree and in three crops has given us about 22 baskets per tree, or an average of over 7 baskets per tree per year since the trees have been in bearing.

In plot 23 we have a condition which will make the old conservative fruit grower gasp for breath.Here we have a case where about 1,000 pounds per acre per year of nitrate of soda has been applied. Based upon previous conceptions of the effect of nitrogen upon peaches, we would have expected but little, if any, fruit and an enormous growth of wood. We secured the wood; but incidently the trees have averaged nearly 9 baskets of fruit per tree for the past three years. In 1914 they actually picked 19 baskets of peaches per tree. Of course we had partially balanced the nitrogen by adding 50 pounds of potash and 50 pounds of phosphoric acid. I can not tell what would have happened if the potash and phosphoric acid had not been added, but I am inclined to believe that we would still have had a good crop. True, the size and color of this fruit was not up to standard. The fruit was not thinned and we could scarcely expect to get large-sized fruit if 19 baskets were left on each tree. The growth of foliage was so great that the sunlight was kept out and the color greatly reduced.

If we examine those plots that totaled 1,500 baskets or over for the three years, we will find that with one exception that they had received annual applications of nitrate of soda. The exception is block 3, where 200 pounds of muriate of potash has been applied annually per acre. These trees, however, are declining and are not in good condition to go on producing crops. The blocks where nitrogen was used are all in good condition and, barring yellows or little peach, they should go on producing large crops for many years. The increase in fruit production has a direct bearing to the increase of nitrogen applied as a fertilizer.

I am not prepared to say whether or not the same results would have been secured if some other source of nitrogen had been used. I am doubtful if tankage or any other source of nitrogen that was slowly available would have

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given equally as good results. I am inclined to believe that bad results would have followed the use of large quantities of nitrogen from organic source. From the observation of this orchard I am also inclined to believe that bad results would follow the use of large quantities of nitrogen from any source if the soil had a high humus content. I have no data to prove these beliefs; they are impressions that I have had while watching the behavior of this orchard and other orchards throughout the State. We all know that bad results often follow the excessive use of barnyard manure in peach orchards. I believe that the detrimental results do not come from the mere fact that nitrogen is applied, but from the fact that the nitrogen is too slowly available and that this fact coupled with the increase to the humus content of the soil is responsible for the bad results. Nitrogenous fertilizers for peaches should be quickly available and practically used up before July 15 or thereabouts.

The old belief that potash was the most important plant food element for peaches has not been borne out by this experience. Potash is important but it does not have as large an influence in fruit bud formation as nitrogen. Potash and nitrogen combined give excellent results, as is shown in blocks 11 and 16. The old saying "potash for color" has not been substantiated by our observations. We have carefully taken notes upon color on the various blocks and we have yet to find any evidence that heavy potash applications are responsible for increased color. Color is largely a matter of sunshine. Increased color comes with diminished leaf surface. The peaches from blocks 3, 1, 2, 5, 18, and 20 were colored practically alike. On the other hand, phosphoric acid, while not decreasing the total amount of color, does appear to deaden it. That is the color on blocks 4 and 7, while present in as great a quantity as on block 3, lacked in sprightliness or life.

That phosphoric acid is not as important an element as potash is shown by comparing the total yield from blocks 11 and 12 and blocks 16 and 17. In block 16 we have a total of 2,952 baskets per acre, while in block 17, when phosphoric acid is substituted for potash, the yield dropped to 2,445 baskets per acre. A like result is shown in blocks 11 and 12. In block 15 we have an application of complete fertilizer in the proportion of N_2KP and we get a total yield of 2,013.8 baskets. In block 16 we drop out the P and we have 2,952 baskets. In block 17 we drop out the K and have 2,445 baskets. Block 14 is situated on lower ground and undoubtedly has suffered from frost, so that these results are suggestive rather than absolute.

In general I believe that detrimental results may come from the use of too much phosphoric acid. I am inclined to believe that these results are due not to any interference with fruit bud formation, but to some interference with proper pollination.

The general effect of nitrogen is to delay maturity; of potash, to hasten maturity; of phosphoric acid, to delay maturity slightly. The delaying effect of nitrogen is much stronger than the hastening effect of potash. This is not

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the place for a critical scientific analysis of these results. I have attempted to point out these results, which have a large economic bearing upon peach production in this State. Of course, you are interested to know if fertilizers pay, and to satisfy your minds upon this point I will show the following table:

TABLE II.

Cost of Fertilizer Applications Per Acre for Seven Years and the Net Returns Due to Fertilization.

Plot No.	Treatment.	Cost of fertilizer per acre for total of seven years.	Total gross receipts per acre, three crops.	Net receipts per acre.	Net receipts per acre per year.
1	K	$17.50	$587.20	$569.70	$81.39
2	Check	0	577.60	577.60	82.51
3	K_2	35.00	1,125.90	1,090.90	155.84
4	P	17.50	624.90	607.40	86.77
5	Check	0	340.65	340.65	48.67
6	P_2	35.00	425.58	390.58	55.79
7	Check	0	336.68	336.68	48.09
8	KP	35.00	625.34	590.34	84.33
9	N	59.50	1,237.87	1,197.37	171.05
10	Check	0	614.55	614.55	89.22
11	NK	77.00	1,562.46	1,485.46	212.21
12	NP	77.00	1,008.53	931.53	133.08
13	K_2P	52.50	567.71	515.21	73.60
14	NKP	94.50	615.59	521.09	74.44
15	N_2KP	154.00	1,287.84	1,133.84	161.98
16	N_2K	136.50	1,773.68	1,637.18	233.88
17	N_2P	136.50	1,415.09	1,278.59	182.66
18	Check	0	503.62	503.62	71.95
19	NK_2P	112.00	648.82	536.82	76.55
20	Check	0	166.28	166.28	23.75
21	NKP_2	112.00	1,068.92	956.92	136.70
22	NK_2P	129.50	1,335.45	1,205.95	172.28
23	N_2KP	213.50	1,782.65	1,569.15	224.17
24	NKP_2	129.50	1,040.60	911.10	130.16

Average net receipts per acre per year of all check blocks, $60.70.
Average net receipts per acre per year of all fertilizer blocks, $135.93.

In this table we figured the fertilizer cost on an acre basis. We have not taken into account the cost of mixing and applying, which would, of course, increase the expense account. The table shows the actual cost per acre of the fertilizers used for the seven years and the actual amount of sales per acre

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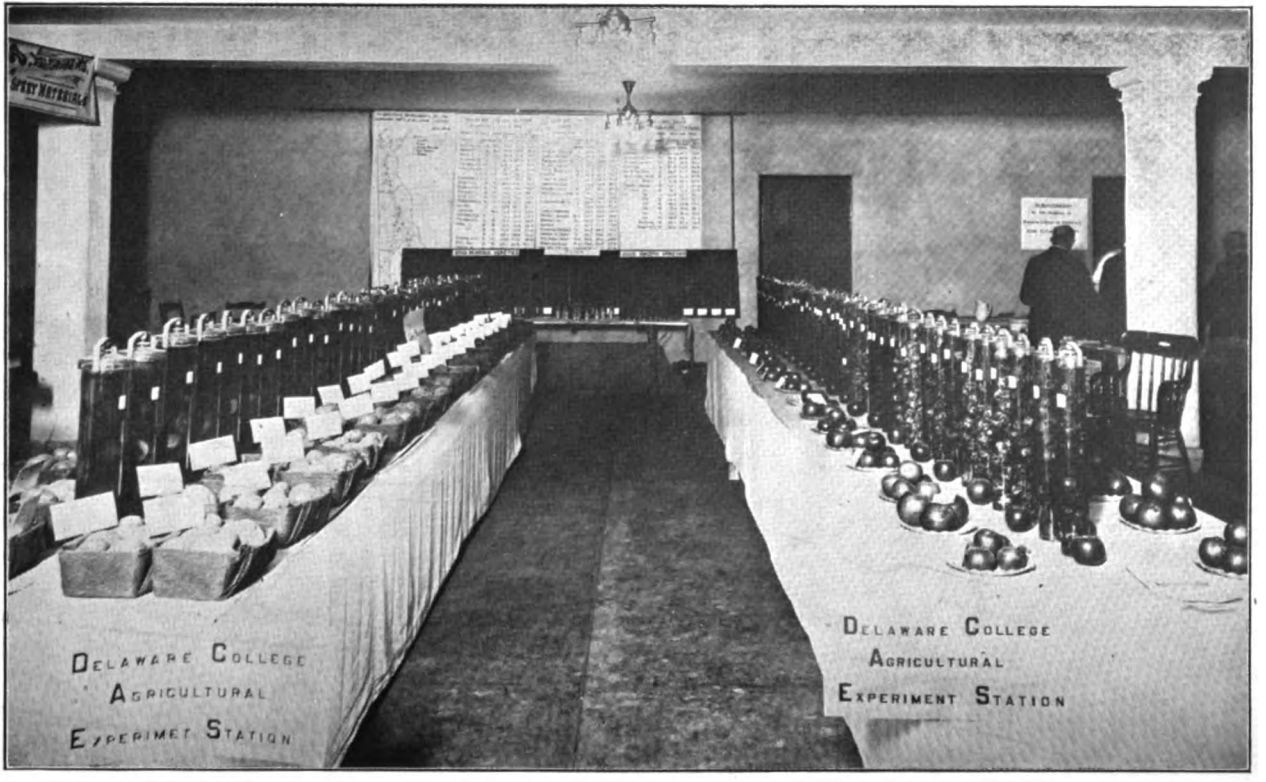

Delaware Experiment Station Exhibit, Wilmington, 1915.

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from the various treatments. The column of net receipts shows only the increase in receipts due to fertilizer alone.

Here again, as in the table of yields, we find that the leading blocks are those that have received nitrogen in their fertilizer treatment. The blocks that have netted above cost of fertilizer for the seven years of over $1,000 per acre are Nos. 3, 9, 11, 15, 16, 17, 22, and 23. All but No. 3 had nitrate of soda applied. Let us look at block No. 23 as an extreme case. The fertilizer for the seven years had been $213.50 per acre; the gross receipts for fruit have been $1,782.65, the net receipts $1,569.15, a greater net return than from any other block with the exception of No. 16, which leads it by about $100. This $1,569.15 means that we have a net receipt of $224.17 per year per acre since the orchard was started. Compare these figures with block 18, which has never received any fertilizer treatment and is the nearest check block. The total receipts from block 18 have been $503.62, or $71.95 per year per acre. Subtracting this amount from $224.17 we get a net return per acre per year of $152.16, due to the use of fertilizers.

In closing I want to repeat that in my belief at least 75 per cent of the peach orchards of Delaware are slowly starving to death, and that in most cases it is nitrogen starvation. I do not believe that there is a commercial peach orchard in the State which, if free from yellows, little peach, and borers, would not be benefited by an application of 300 pounds or more of nitrate of soda applied broadcast in the spring.

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REPORT ON NUTS.

J. W. KILLEN, Felton.

The subject of nut growing is very interesting to me, but it is not interesting to many. I have quite a number of nut trees that are really profitable on the farm, not only for home use, but for commercial purposes. Of the chestnuts there are several types, taking the American, English, and Japan. Of recent years they blight very badly. The American chestnut is almost wiped out because of the blight. We sprayed the Japan chestnut and used lime-sulphur and the blight was held in check for a number of years. The trees were given quite a pruning, and they bore possibly a bushel of nuts this year, after being affected three years. I thought the tree would die after it affected the main part of the tree. The Japan is almost immune. There are thirty or thirty-five varieties and I have found that the blight has cleaned the American chestnut about out, but it has left the Japan. Some people say that the Japan nuts are no good. I find some of them just as sweet as our American chestnut, while others have a bitter, thick skin.

Mr. Roberts—Are they not nearly all that way?

Mr. Killen—There are several that are good in quality. They ripen possibly a month before frost. We should try to get those of the highest type and still bear chestnuts. The most promising nut is the Persian walnut, or English walnut. I have trees that are seedlings of both. Have some six years old that are almost as good quality as the paper shell from California. They crush in the hand. We can grow the Persian walnut very successfully of the higher types, and I think we have a fine opening to grow nuts for profit. I have received some from California that are very tender. If the thermometer drops to zero, they are killed. The Persian walnut staminate buds grow on the last year's wood and the pistilate on the current year. You can find types of the Persian walnut that are hardy in the bud. We have taken the hardy kinds and cross fertilized with the tender kinds and have produced different types of nuts, but have not gotten any of commercial value. One in the lot never bore nuts and does not put out foliage until the first of June, but grows rapidly then. The usual time is the first of May. This off tree is ten years old and is three times as big as other varieties of the same age. Some hybrids are very good, but not better than our common Persian walnut. Farmers should take a greater interest in nut culture. It takes only five or six years for them to come into bearing.

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The pecan is worthy of trial. I have ten different varieties. The better and larger varieties are too late. We have a number of seedings that I consider very fine and it is worth all the trouble to propagate these by grafting. I have a paper shell variety, rather small, that is just coming into bearing. One of these seedlings, one of the finest, ripens before frost, and I think this is one of the most promising.

Question—At what age do they begin to bear?

Mr. Killen—At from ten to fifteen years. I know a number of trees that are twenty-five to forty years old that bear heavily. You can plant them in out-of-way places and they make a fine tree for ornament also. I have never succeeded in grafting the Persian walnut on the pecan or chestnut.

The shellbark is another one worthy of trial. I have a tree bearing that is five or six years old, and it bears annually.

The black walnut is also one worthy of trial. You will notice on the table quite a number of black walnuts that are of first-class quality. They come into bearing quite early and the timber is valuable and the nuts quite profitable. All these nuts are subject to diseases just like fruit trees. We have the blight of the chestnut, rosette of the walnut, a disease which affects the Persian walnut and the black walnut similar to the yellows of the peach. I like the cordifornis as well as any. They begin to bear three or four years from seed and have been known to bear two years from seed. They grow in clusters like grapes, are not very large, but you can tap them on the end and the kernel comes out almost the same as a filbert or hazelnut. The quality is good. Some of them are like butternuts and are rough rather than smooth, but it is one that is worthy of trial.

The filbert or hazelnut has been almost an entire failure with me. I had twenty named varieties and they have all gone out, with the exception of one or two. The blight affects the wood. They are a total failure as a commercial nut. Have had trees possibly six inches in diameter, and perhaps larger, but they are killed out. We should take more interest in commercial nut growing and growing for home use.

Professor McCue—The Experiment Station is trying to get records of seedling trees. In Baltimore hundred we found two trees of the black walnut that have very good nuts. If anyone knows of any seedling trees, either of the black walnut or English walnut, we would be glad to hear of them.

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REPORT OF COMMITTEE ON FUNGOUS DISEASES.

THOMAS F. MANNS, Plant Pathologist, Delaware College, Newark, Del.

INTRODUCTION.

In addition to making the usual report on fungous diseases for the year, it is the aim of the committee to include a brief summary of important progress in control of diseases and legislation which is of interest to horticulturists of the Peninsula.

THE WORK OF THE FEDERAL HORTICULTURAL BOARD.

It is gratifying to this committee, and certainly to all interested in the control of fungus and insect pests, to note with what zealous interest the Federal Horticultural Board is actively placing barriers by means of quarantines and embargoes to prevent the importation and interstate spread of dangerous plant pests. The past few years have seen more activity along these lines than have the several preceding decades. The Federal Horticultural Board maintains a corps of inspectors at every port of entry for the inspection of nursery stock, bulbs, tubers, roots, etc.; men whose duties are to intercept and destroy stock infested with dangerous parasites. By means of these inspectors the Board is keeping every pathologist and State inspector throughout the United States informed of their findings and the possible dangers. This important work can not be regarded lightly. The more recent quarantines are those against European and Canadian shipments of potatoes on account of powdery scab, black wart, etc., and the quarantine against all foreign shipments of citrus nursery stock, including buds, scions, and seeds, due to the outbreak in the Gulf States of a dangerous citrus canker. The State of Maine, and more recently parts of the State of New York, have been quarantined against shipments of potatoes on account of areas that are infested with powdery scab.

QUARANTINES AND THE NEED OF UNIFORM STATE LAWS.

It is needless to tell you that plant disease quarantines, although entirely justified, cause much financial loss to every district so quarantined, no matter how expeditiously the work of inspection is done. The first great loss is the turning away of buyers from the infested districts. We usually think of

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these districts as States, rather than by the particular county or area infested. Immediately upon the discovery of a dangerous disease the Federal Government places quarantine on the whole State or counties to prevent interstate shipment until the local infected areas are determined. Other States then take up the prohibitory measures, and, the States not being in a situation to define the infected areas, usually make their measures to include the whole State. Great injustice is done growers and nurserymen through such irregularities. To feel the keenness and anxiety caused by quarantine one need only to have been a member of the potato party which last August visited the potato districts of Maine. To show you what injustice and economic loss the lack of uniform State laws may cause allow me to cite you one instance which has come to my notice. A large, flourishing citrus nursery in the South was suddenly brought to face the citrous canker quarantine measures. The company, to meet the fall and winter trade, asked for Federal and State inspection. The inspections were made and the stock was found free from the disease. The disease was not found within many miles of such nursery. Certificates were issued. When orders were filled and ready for shipment, owing to other regulations, the authorities ordered that the certificates should not be used, which was equivalent to saying your stock is worthless, when such stock had been found all right by authorized inspectors. In 1914 it was found necessary that potatoes and citrous nursery stock should be quarantined in certain areas. Next year it may be apple, peach, strawberry, or the small fruits, coming within the range of our own interests.

The Federal Horticultural Board is urging uniform nursery and inspection laws, that will work injustice to none, but will greatly facilitate handling situations when areas have to be quarantined. May the legislatures of the States of this Peninsula look carefully into such measures and enact laws which will guard our interests under such quarantines.

THE POTATO TRIP.

On date of July 3 the Secretary of Agriculture, Hon. D. F. Houston, sent an invitation to Director Harry Hayward, dean of the College of Agriculture, asking the station and college to have a representative participate in a series of potato conferences, the object being "the promotion of the breeding of new, productive, and disease-resistant varieties, the production of improved strains of standard varieties for seed purposes, the elimination of diseases that are carried by seed potatoes, and the introduction of an official system of seed inspection and certification with adequate standards and safeguards."

The writer represented the State and college. The aim of the Department of Agriculture was the bringing together of potato specialists from the United States Department and from the various States. On special invitation Dr. Otto Appel, of Berlin, Germany, probably the greatest authority on the diseases of the potato, was a guest of the Federal Department of Agriculture on this occa-

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sion. Dr. Guessow, botanist of the Dominion of Canada, was also a member of the party in its trip through New Jersey, Rhode Island, and Maine. Prominent among the American constituents of the party were the following: Dr. W. A. Orton, representing the Department of Agriculture (a member of the Federal Horticultural Board), who personally had charge of the itinerary; Prof. William Stuart, in charge of potato investigations for the Department of Agriculture; Prof. J. C. Corbett, Acting Assistant Secretary of Agriculture.

Much interest centered in Maine because of the Federal quarantine on powdery scab. Great credit must be given the U. S. Department of Agriculture and the State authorities of Maine for the energetic manner in which they have taken hold of the potato situation in that State. The State authorities quickly realized that the only way to meet the Federal quarantine was by a united effort in limiting the disease and improving the seed potatoes. This is being accomplished along lines suggested by the U. S. Department of Agriculture, following practices which have been in vogue for some time in Germany. We have much to learn from Germany in the way of fostering agriculture. At the present time, when Germany is undertaking a gigantic task in the way of war, it was interesting to listen to Dr. Appel in his different talks before the Boards of Trade in the various towns in Aroostook County, Maine, tell how Germany, in developing the potato industry to the enormous extent it has, was virtually carrying out a war measure; actually a case of trying to produce within its confines the starchy foods required to maintain its population when harassed and hemmed in by its enemies. Germany produces more than 1,500,000,000 bushels of potatoes. Prior to the war only 12 per cent of this amount was consumed directly as food by the population. Of the remainder 40 per cent was used as stock food, 10 per cent for the production of starch, and 6 per cent for the production of alcohol. About 12 per cent of the tillable land of Germany is placed into potatoes each year and the average yield from the use of only 600 pounds of commercial fertilizer is over 200 bushels per acre. The average production for the United States is less than 90 bushels per acre. Our total production is around 300,000,000 bushels, about one-fifth of that produced by Germany. We consume less than 3 bushels per capita per annum, while Germany consumes nearly 8 bushels per capita.

Dr. Appel in his talks carefully explained the German system of field inspection and the certification of seed. He pointed out the great advantage of the system. The inspectors would visit the field at blossoming time, when a careful estimate of the amount of disease and impurity of strain would be noted. If the amounts of disease and impurity were too great to be eradicated by "roguing" (pulling out), no certificate for "seed use" would be issued for that particular field.

On the other hand, if the amount of disease was small, say 2 per cent or less, and the varietal characters quite constant, then the owner would be permitted to enter the field for seed purposes, provided he would carry out the instructions of the inspector for properly roguing the field. The inspector

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would then plan on two more visits, one within a short time, to see whether the "roguing" was properly carried out and at the same time note whether disease was increasing. If the "roguing" was not carried out the certificate would not be granted and the seed, accordingly, would not be certified for seed purposes. On the other hand, if the roguing was properly carried out and the disease was properly controlled the field would be listed for further inspection, but if the disease was still in evidence or rapidly developing, no certificate for seed purpose would be granted. Dr. Appel clearly showed how beneficial this system of inspection proved toward increased yields.

The U. S. Department of Agriculture, following the lead of Germany in this work, has proposed a standard and procedure for inspection and certification of seed potatoes in Maine and other seed producing States.

THE SEED POTATO SITUATION.

The State of Maine, following the suggestion of the Department of Agriculture, appointed a State inspector and certifier of potato seed stock. At the time of our trip through Aroostook County (July 31) the State inspector then had listed 2,500 acres of potatoes that he thought would meet the requirements for certification. Probably before this season was over he had listed between 3,000 and 4,000 acres; this area averaging 300 bushels per acre will mean around 1,000,000 bushels of splendid seed stock. This is only the beginning required to meet the demands for seed potatoes, but the advantage gained will a hundredfold meet the small cost of roguing and certification. Two large Aroostook growers and dealers in seed potatoes this past season paid two college-trained plant pathologists at the rate of $1,200 per year to carefully treat and rogue some 1,000 acres of potatoes, so that they will be able to meet the requirement for State and Federal certification. Just a word here to our growers of potatoes. I am firmly convinced from what I saw in Maine and New York, that it will pay our potato men to lay out 25 cents, or even 50 cents, per barrel more to purchase certified seed than to buy ordinary stock, more or less filled with disease, and some which is 10 to 25 per cent off in varietal purity. Let me carefully explain what is meant by these statements. We saw many fields that contained a considerable per cent (1 per cent to 10 per cent or more) of blackleg, a bacterial disease which under our climatic conditions is much more severe than in Maine. Likewise we saw so-called Cobbler fields (Cobbler has purple blossoms) which contained from 10 to 25 per cent, and some even 50 per cent, of white blossoms, showing a mixture with Green Mountain or some related variety which is much later in maturing than Cobbler. Now, if we are catering to early market, or want the land for second crop, such a mixture means practically a loss to the per cent of the mixture, as the Green Mountains are just beginning to set well when the Cobblers are ready to be put on the market.

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POTATO SEED CERTIFICATION.

Dr. Orton, of the U. S. Department of Agriculture, called a conference of the plant pathologists, plant breeders, and other officials interested in State inspection and certification of seed potatoes at Philadelphia December 28, during the meetings of the American Association for the Advancement of Science. This was the third conference of this kind. The first was called at Washington following the public hearing a year ago and the second at Atlanta, Ga., in December a year ago. The seasons' experience in potato inspection and certification was reviewed. The subject of inspection standards and inspection procedure was taken up with the aim of formulating State standards. The question of uniform legislation was also considered. Maine, Wisconsin, and other States are readily falling in line for the bettering of seed potatoes both from the standpoints of variety and disease.

BREEDING AND SELECTING DISEASE RESISTANT PLANTS.

The United States has done little in breeding disease-resistant plants. We have done some selection along that line, notably in cotton, melons, and flax. The field is a rich one and our Federal Government could well afford to increase by tenfold the workers in this line. Germany has taught us a great lesson in the remarkable progress she has made in the breeding of high-yielding, disease-resistant varieties of potatoes. The U. S. Department of Agriculture, following the lead of Germany, has for several years been actively at work breeding and selecting superior varieties of potatoes. Prof. William Stuart has charge of this work. The breeding plots are located in three States. The task is a slow one and a tedious one. Several thousand crosses and selections have been made. The work shows evidence of much promise. Many of the crosses are miserable failures that readily go down with apparent inherited weaknesses. Others show great promise. If one hybrid or seedling in a hundred or a thousand is superior to its parents, the gain can not be measured in the months and years it has taken to produce it, nor in the salaries of the men employed at the task; it is a direct gain for generations to come.

Dr. Jones, of Wisconsin, has made rapid progress in the selecting of disease-resistant cabbage against fusarium wilt. His resistant plants gave yields of 18.3 tons and 19.2 tons per acre as compared with 1.85 tons and 2.25 tons in the commercial strains, this of course being on wilt-sick lands. I have tried out some of Dr. Jones' strains and find much promise from his work. We have great need of the breeding of wilt-resistant strains of tomato, cantaloupe, watermelon, cucumber, potato, sweet potato, and many other plants.

A PROMISING NEW FUNGICIDE.

Under this heading Prof. W. M. Scott reported, at the meetings of the American Association for the Advancement of Science, a season's work on a

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new spray made from a polysulphide of barium. He points out the advantage of a spray material that could be shipped in the dry form, and which would readily go into solution when moistened. He finds this barium sulphur compound to readily do this. To bring this information to you I quote Mr. Scott:

"Further experiments to determine the fungicidal value of this material were conducted under the writer's supervision in Alabama, Virginia, Pennsylvania, and New York. Following the usual summer spraying schedule it was applied on apple trees at the rate of 3 pounds and 6 pounds, respectively, to each 50 gallons of water in comparison with lime-sulphur solution.

"The barium sulphur when used alone or with arsenate of lead produced no injury to fruit or foliage and controlled fungous diseases to about the same extent as lime-sulphur solution. No serious outbreak of apple scab occurred on the checks in any of the experiment orchards, so that the test could not be considered a severe one so far as this disease is concerned. However, in a peach-spraying experiment conducted at Hancock, Md., barium sulphur crystals used at the rate of 3 pounds to 50 gallons of water controlled peach scab (Cladosporium carpophilum) almost completely, while 98 per cent of the unsprayed fruit was affected. It is evident, therefore, that this material has decided fungicidal properties, and, in the writer's opinion, it is worthy of further investigation."

PLANT DISEASES ON THE PENINSULA IN 1914.

The year 1914 was characterized by an exceptionally late spring, accompanied throughout by heavy, cold rainfall. Summer opened early and brought us one of the most prolonged droughts we have experienced in recent years. This resulted in aggravated forms of all the wilt types of diseases. This includes the wilts of tomato, watermelon, cantaloupe, potato, sweet potato, and other plants. Foliage troubles as a whole were not as severe as in other seasons. Some of the more active outbreaks of fungous diseases were the following:

TWIG BLIGHT OF APPLE AND PEAR.

This disease, caused by a bacterial organism, is usually communicated from cankers on the trunks of pear or apple. In the early spring there exudes a sticky sap from these infested cankers, which is literally swarming with myriads of bacteria. The bees and other insects to obtain food and water visit these sap flows and carry myriads of bacteria to the apple and pear at time of blossoming. Several weeks later we begin to observe the work of the bacterial infection. The disease can be greatly limited by carefully cutting out all cankers one inch beyond the dead area and following this by disinfection with a one-tenth per cent solution of corrosive sublimate. The disease demands further study. There is a bare possibility that beehives, mud holes, and other drinking places visited by bees become infested. New

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York has found that the tarnished plant bug (Lygus pratensis) is a carrier of the disease. This insect is a mischievous fellow along many lines.

THE "STOP-BACK" OR "CHECK" OF PEACH TREES IN NURSERIES.

A serious trouble of nursery peach trees known as "Stop-back" or "Check" has been common on the Peninsula for a number of years. Some seasons it becomes so serious as to cause much loss financially. This season it was exceptionally severe. The trouble has been studied by prominent entomologists and usually pronounced to be the work of insects. Dr. Quaintance, of the U. S. Department of Agriculture describes a mite (Tarsonemus Waitein) as active in bringing about the trouble. Dr. Back, of Virginia, and others find the tarnished plant bug (Lygus pratensis) the culprit responsible for the trouble. Dr. Cook, of New Jersey, finds a fungus (Sphaeropsis) causing a somewhat similar disease in that State. The writer finds no evidence of the trouble in this State being fungous or bacterial, nor is there evidence of the trouble being mites. The preliminary injury and the resulting effects is more like that which follows the work of the tarnished plant bug.

APPLE TROUBLES.

In my previous report especial attention was called to the importance of the dormant spray—that is, the concentrated spray just prior to the blossoming period. This spray, when thoroughly applied, starts the tree off with a clean bill of fare. Much of the lice or aphid trouble will be eliminated with thorough work by this first spray. All the spores of peach scab and curl which carry over in the buds and twigs of the tree will be destroyed by this spray when the work is thoroughly done. This is likewise true of scab of apple. The spray directly following the fall of the blossoms is a most important spray, and most of the failures to control the scabs, leaf curl, codling moth, and curculio result from improperly carrying out this most-needed application. Many growers think of the dormant spray as chiefly valuable for San Jose scale, when, as a matter of fact, it is the big clean up occasion, especially if done in the spring just prior to growth. Don't neglect the dormant spray; do it thoroughly. Likewise the spray just directly following the blossoming period. These sprays catch the scabs, the peach curl, the lice, San Jose scale, curculio, and many other of the more severe troubles.

THE PLANT DISEASE SURVEY.

In order to more carefully carry out the plant disease survey the writer sent out to our constituents a mimeographed form, on which was listed the more important cultivated plants of the Peninsula and simple instructions for recording diseases and success of control. Franked tags, cards, and envelopes were included. The response was excellent and I wish to take this op-

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portunity of thanking those who so willingly sent in the information. Specimens in many cases were sent in which verified the observation. It is the desire of the committee that this means of getting a larger survey be used more extensively in the future.

A copy of this mineograph letter follows:

"Dear Sir:

"The Experiment Station is undertaking a systematic study of crop diseases caused by fungi and bacteria on the Peninsula. It is intended to determine as accurately as possible the extent of the injury resulting from these diseases and the best possible methods of preventing them. As you already know, much of the annual loss from these diseases is preventable.

"To a person in your position it is not necessary to emphasize the value of such information. We are, therefore, asking for your aid in collecting this data. The outlay of a little time on your part will be of great help in controlling the serious epidemics of plant diseases in the future.

"I am sending you a number of cards for reporting the important data concerning your worst plant diseases of this season. I am also sending some mailing tags. These cards and tags may be used without any postage. The tags are for sending in specimens of disease for identification. In sending in disease material with these franks (free tags) simply wrap plants well in newspaper or place them in a strong cardboard box, properly wrapped and tied. The tags, when attached to package, will carry 20 pounds or less without postage. Upon request we will be glad to send you information on how to control the different diseases.

"While we wish all the general information you can give, we want, especially, information on the following diseases:

Alfalfa:
- Leaf Spot
- Crown Rot

Apple, Pear, Quince:
- Bitter Rot
- Black Rot
- Scab
- Twig Blight
- Crown Gall
- Stem Canker

Cherry and Plum:
- Leaf Spot
- Black Knot
- Ripe or Brown Rot

Chestnut:
- Blight

Chrysanthemum:
- Rust
- Yellows (wilt)

Asparagus:
- Rust

Beans:
- Leaf Blight

Blackberry and Raspberry:
- Rust
- Anthracnose (stem)
- Crown Gall (root)

Cabbage and Cauliflower:
- Black Rot
- Foot Rot (wilt)
- Soft Rot
- Club Root
- Yellows (blight)

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Cantaloupe:
- Leaf Blight
- Wilt

Carnation:
- Rust
- Wilt

Grape:
- Mildew
- Black Rot
- Ripe Rot
- Crown Gall

Lettuce:
- Drop

Oats:
- Smut
- Yellows
- Rust

Peach:
- Yellows
- Scab
- Blossom and Twig Blight
- Crown Gall
- Stem Canker
- Brown Rot
- Leaf Curl
- Little Peach

Potato (White):
- Black Leg
- Wilt
- Leaf Spot (Early Blight)
- Tip Burn
- Scab, Common
- Rosette
- Late Blight
- Scab, Powdery

Clover (Red, Alsike, Crimson):
- Crown Rot (crimson clover)
- Leaf and Stem Blight
- Stem Blackening
- Dodder (climbing plant)

Corn:
- Rust
- Smut
- Ear Mold

Cowpea:
- Leaf Blight
- Wilt

Cucumber, Squash, Watermelon:
- Wilt
- Leaf Spot

Dewberry:
- Double Blossom
- Crown Gall (root)
- Rust

Eggplant:
- Fruit Spot
- Blight

Rose:
- Twig and Bud Blight
- Rust
- Mildew

Soy Bean:
- Stem Canker

Strawberry:
- Leaf Blight

Sweet Pea:
- Root Rot
- Mildew
- Bud and Leaf Blight

Sweet Potato:
- Black Rot or Black Shank
- Soft or Mush Rot
- Scurf or Soil Stain
- Stem Wilt or Yellows
- Charcoal Rot (black throughout)
- Soil Rot (pit or pox)

Tomato:
- Early Blight
- Wilt or Sleeping Sickness
- Leaf Spot
- Fruit Rot
- Late Blight (action rapid)

Wheat:
- Mildew
- Rust
- Smut (loose)
- Smut (stinking)
- Scab

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"Since the information asked for relates to diseases in the present year, it can not all be sent for several months, but it is hoped that the important facts will be sent in on cards as soon as possible after they are known. Additional cards and tags will be sent upon request.

"For the season's report you can use this letter in the fall, returning it in the enclosed postage-free envelope. In marking the letter use a pencil and give only an estimate of the per cent of plants infected with the particular disease and what treatment was used. Place a zero (0) where no disease occurred. Leave blank in case you have made no observations or used no treatment. An example of marking is here given on tomato and cabbage and cauliflower:

Tomato:	Cabbage and Cauliflower:
10% Early Blight (Bordeaux)	2% Black Rot
Wilt or Sleeping Sickness	0 Foot Rot (wilt)
Leaf Spot	Soft Rot
Fruit Rot	Club Rot
	Yellows (blight)

"Your correspondence will be cheerfully answered. We are at your service.

"Yours very truly,

"Plant Pathologist."

Name of Correspondent.....

Address.....

A summary of the many reports received was very interesting. Failures to control apple and peach scab (25 and 50 per cent infections were reported) were numerous and in most cases could be attributed to not carrying out the important sprays as previously discussed. This is also true for bitter rot of apple. The tomato difficulties were mostly those of wilt or sleeping sickness, due to placing beds on infested soils and planting on fields which had previously become thoroughly sick. Nothing short of breeding resistant plants will be successful on sick soils. The mosaic disease was very severe this season. This disease is infectious and may be carried in the seed; the cause is unknown. Potato scab in many cases was due to soil infection rather than seed. When soil is badly infested seed treatment is of little avail. The leaf blight of strawberry was very severe. Resistant varieties are doing much to lessen this trouble. The value of corrosive sublimate for surface disinfection of sweet potatoes was evident in many cases. More care is being exercised in sweet potato seed beds.

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SWEET POTATO DISEASES AND STORAGE IN 1914.

The summer of 1914 was unusually dry. Its effect was to considerably reduce the sweet potato crop. The dry weather was offset to some extent by a scarcity of the diseases of that crop in the field. White rust and Septoria leaf spot, which were very prevalent last year, were almost absent this season. Black rot, too, was less prevalent at digging time. Diseased fields of previous years produced almost a clean crop. Stem wilt, which showed evidence of considerable spreading last year, was somewhat checked, although not to a great extent. The dry weather seems to have been a minor factor in checking the disease. This trouble has gained a strong foothold in Delaware and Maryland, but was rather scarce in Virginia, where only a trace here and there was observed. Unfortunately for Virginia, the foot rot was quite prevalent in 1914, its symptoms being somewhat like stem wilt. Foot rot as yet has not been found in Maryland and Delaware, although careful searches have been made for it in these States. Soil stain was found prevalent on the entire Peninsula on those lands where sweet potatoes have been grown for years, however the disease was limited on new lands. The pox or pit disease was very severe and prevalent in Kent County, Del.; only a mere sprinkling of it was found over other parts of the Peninsula where sweets are grown. Recent work with lime indicates that this disease behaves very much like the ordinary scab of white potato—that is, it increases the disease. With the presence of this disease in almost every sweet potato land, liming would mean ruin of the crop.

Because of dry weather the sweet potatoes were well matured and not watery at harvest time, a condition almost ideal for storage. During the sweating process the weather also was ideal, which permitted thorough ventilation.

Up to date, and because of the early favorable storage conditions, soft rot is rather limited as compared with its prevalence a year ago. Mice have been active factors in preventing good keeping. The largest per cent of soft rot now found in every house is very plainly due to gnawing work of mice. Injury in these cases opens the way to soft rot. The mice problem in the storage house is second in importance to the moisture problem. Control of these mice by strychnined wheat is very easily carried out.

Black rot is prevalent now in storage houses which lack ventilation facilities. In such houses the temperature, in spite of all regulation, remains from 60 to 70 degrees F., and this is conducive to black rot after the sweating.

CUCURBIT DISEASES.

Mention has already been made of the very dry summer. This had a setback effect on all cucurbits. Flea beetles were very troublesome to young seedlings, necessitating several reseedings. The dry weather, too, had a

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weakening effect on the older plants. Many instances were noticed of cantaloupe plants dying from drought. Others were so weakened as to become a target to fungus pests. The black aphis and the striped cucumber beetle were plentiful. Little bacterial wilt was noticed on cucurbits this season. A leaf spot, however (cause unknown), brought about much premature dying of watermelon plants. The Macrosporium leaf spot on cantaloupe was also prevalent. Two bacterial rots were fairly prevalent on watermelon fruits. The anthracnose was scarce this year. An Adams Fund problem on cucurbit diseases has now been taken up by the Delaware Station. Likewise a project on peach yellows, little peach, rosette, and related diseases is now under way. Co-operation of growers on the Peninsula is solicited.

A PURE SEED LAW.

Uniform pure seed laws are needed throughout the different States. At the present time Delaware has no law. The writer has drafted a rough outline for a bill, which it is hoped the legislature will take up at its present session. The urgent need for such a law is in evidence everywhere by the abundance of narrow plantain and dodder which is so prevalent.

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BETTER SEEDS.

FRANCIS C. STOKES.

The general subject of good seed has now come to be one of the most important ones in the work of the planter; in fact, the better seed question has taken a great hold on the country at large. There is scarcely a single gathering of farmers but something is said on the subject of seed. Our agricultural colleges are making it one of the most important features of their work. They are educating their people to a greater point of efficiency in all departments of agricultural work and they are particularly strong on this question. Realizing the tremendous demand by planters generally for something that would more nearly fill their requirements, a few of us up in New Jersey have gotten our heads together and have taken up the whole subject as a matter of business and have thoroughly investigated it from all sides. So far we have at least come to a few very definite conclusions.

To begin with, the planter and seedsman are not working on an intimate basis. They do not thoroughly understand each other. The average seedsman in the past sat quietly in his office and men from various parts of the country came to see him offering for sale their seed, which was purchased very often with the idea of getting the cheapest regardless of the consequences. When the seedsman had made arrangements for the filling of his warerooms he would spend the next six weeks hard at work on the seed catalog. This catalog would perhaps have hundreds of varieties in it which were listed simply to give the appearance of having a complete book. There might be forty or fifty different names of radishes listed when in reality there were not more than fifteen or twenty different varieties in his warehouse. This, of course, means a vast amount of double naming and, in addition to that, a vast amount of detail which could never be looked after as it should be. At the same time, the customer was the man to suffer.

All this time the farmers and market gardeners were working along as best they knew how, usually getting a fair quality in their seeds, getting hit pretty badly once in a while on certain items which did not come as the seedsman said they would; and once in a while getting something exceptionally fine, which kept them on an average in a very good humor. They purchased their seed from seedsmen with the utmost confidence and the seedsmen, to the best of their ability, were taking care of their business.

Matters went along this way quite smoothly for some fifty years, and perhaps would have continued so had it not been for the more advanced

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Corn Exhibit, Wilmington, 1915.

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methods of the new generation which is now in charge of affairs. From the splendid work of such societies as this one, from the farmers' institutes and various other agricultural and horticultural organizations planters have now come to realize that the matter of good seeds is one of the most important in their entire round of work. When a seedsman is willing to stand back of his seeds today with strong assurances as to their purity of type and high vitality it is only natural that the intelligent planter should ask what proof there is for believing that this seed is as the seedsman says it is, and is he not justified in demanding such proof? In nearly every case a final reckoning of success or failure for the year will in large measure depend on this one point.

To begin with, there is a necessity for a changed attitude on the part of the seedsman toward the grower and on the part of the grower toward the seedsman. The successful seedsman in future will work with the planter on a face-to-face basis, open and aboveboard, and not from behind protection of a legal disclaimer, as necessary as that is. The seedsman can not be held financially responsible for crop losses, and it is out of good reason to think that he ever can be, but he must, nevertheless, feel his responsibility in the matter to a greater degree than he does at present. He must have a finely developed sense of honesty and honor. He must sell his products not for the money that can be made, but for the good that can be done the planter. Taken on an average, the American seedsman is a high type of business man. His chief fault lies in the fact that he is not altogether awake to the demands and opportunities which are before him. I believe that the market gardener, however, has been partly to blame for a great deal of the careless work which has been done by the seedsmen. Until within a very short time he has not insisted as he should on knowing all there was to know about the seeds which he purchased. There have been too many growers who ask the question "How cheap?" rather than "How good?" This practically forces the seedsman to go to rather questionable sources for their seed supply. Consequently when a planter would come to a seedsman and ask the price of tomatoes and be told they were $3 per pound he would say the price was high; he could buy them elsewhere for $1.50 per pound. The seedsman did not like to lose his sale, so he got into the habit of carrying a cheaper grade of seed along with the better grade. The next time Mr. Planter came into his store to buy a pound of $1.50 tomatoes he got it (and when July came he got it in another way). This was the condition of affairs up to two years ago.

Feeling that a paper of this kind would be of little value unless there were some constructive suggestions in it for the solution of the problem, I will go over a few of the points which seemed to stand out as the most important at the time of our investigation. In the first place, in order to conduct a seed business as it should be conducted from the standpoint of the commercial grower, it is necessary to inaugurate a system which will have two very important ends in view. In the first place, it is absolutely necessary to insure the planter against error of any kind. In the second place, the great work of seed

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improvement is of the utmost importance. We will deal with the first point, that of inaugurating a system for proving the type of seed sold. In order to do this successfully it is necessary to simplify the business so that it may become humanly possible to keep a watchful eye over every individual detail. To begin with, therefore, all unnecessary varieties representing the same type of vegetable must be eliminated. This will be by no means a hardship to anyone, for under this system the seed buyer will be able intelligently to order and will not be hopelessly at the mercy of his seedsman. Thus by the elimination of a vast amount of detail the seedsman will be able to conduct his business on a more strictly business basis. In addition to this it is necessary that the seedsman should conduct the growing end of his business in a somewhat different manner than has been practiced generally in this country. At present the large majority of his seed is grown for him under contract by commercial seed growers who are situated in various parts of the world. Nine out of every ten seedsmen will absolutely rely on these growers, never suspecting that there is always an opportunity of an intentional or careless mistake being made. Every seedsman ought to have a means of checking every pound of seed which is sold from his seed house, so that there is no chance whatever of the commercial grower getting something which he did not want to get.

To be sure, the seedsman sells an unfinished product. By looking at a lettuce seed it is absolutely impossible to tell what type of a head it will develop into. There must be other methods. For ourselves, we have formulated the following: Our plans have not been all worked out as yet, but we believe they will came as near taking care of the problem as anything so far suggested. To begin with, we expect to grow, as far as is practicable, all of our own stock seed on our home farm in New Jersey. This seed will be developed to as near perfection as possible, after which it will be sent to the far corners of the earth to be grown by experts as our own private crop, and not as seed such as that grown for our Congressman. Where it is at all possible these crops will be personally inspected, both at growing time and at harvest, in order that their trueness to type may be beyond any question of doubt. In such cases where it is absolutely impossible to examine crops owing to the widely scattered territory in which they are grown, such as New Zealand or the Tenriffe Islands, it will be possible to have the crop grown a year in advance in order to have it thoroughly tested on the home farm. In some cases, with items such as radish, etc., test can be made during the winter under glass. Under this system it will be possible to have a check on everything before it is sold. In addition to this the germination test will appear on every package, from a packet up to a ton. So much, then, for the first steps which should be taken in order to put a seed business on a solid foundation.

Then there is the other point, which I will merely mention: In order to take care of the future we must keep looking ahead at all times, for there is still greater work to be done—this along the lines of seed improvement. It is

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impossible to imagine what advances the agricultural world would have made at this time had as much effort been put on the question of seed and plant breeding as has been put on various other lines of activity. Although there are some high-class men in the seed-growing business in this country, there has been practically no scientific word done along the above lines. The industry of seed growing, selecting, and breeding is merely in its infancy. The great work that lies before us has scarcely more than started.

INSECT CONTROL.

E. N. COVEY, Associate Entomologist, Maryland Agricultural College.

It is a great pleasure and privilege to be asked to address this body because its members are among the most progressive and up-to-date horticulturists of the United States, and I know that they realize the value of insect control. When we know that of the apple crop of 1914 only 40 per cent of the 259,000,000 bushels can be classed as commercial grades, the value of spraying is emphasized. These figures are taken from the U. S. Department Crop Report, and we all know of that commercial crop only about 10 per cent could be classed as fancy fruit. You gentlemen who are using up-to-date spraying methods are reaping the profit that attends the production of high-grade fruit and other horticultural products, for the statement holds true in general for all crops.

Insects increase slowly year by year unobserved, because their damage is negligible until the year comes when they become numerous enough to constitute a pest. Then, following a year of severe injury, the pest usually decreases to such numbers that they are not noticed. In this reduction of numbers the careful horticulturist plays his part by killing immense numbers by spraying. But by far the greatest factors are the natural enemies of the insect. Along with the multiplication of the pest occurs a more rapid multiplication of its parasitic enemies and a congregation of its predatory enemies, such as birds in the infested neighborhood. However efficient these natural aids are in keeping the balance of nature, we must remember that they are efficient after the greatest amount of damage is done. To illustrate what may be done by an insect unchecked by natural enemies, I might call your attention to the destruction accomplished by the Gypsy moth in New England. There was a case of an insect being imported without at the same time introducing its natural enemies. The alfalfa weevil introduced into Utah is another example. Many more could be cited.

The thought that I wish to impress upon your minds is that your State, be it Delaware or Maryland, is, under the present arragnement, subject to an inva-

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sion by some foreign pest, and by foreign I mean new to your State, that may prove as costly to your State as the examples that I have cited have been, and are, to the States involved.

Fortunately, we have a Federal Horticultural Board, which is empowered to quarantine infested areas or countries, and which supervises the inspection of imported stock. But this is not sufficient. What we need is statutes providing for the inspection of interstate shipments and appropriating a sufficient sum so that the inspection service can be placed on the highest plane of efficiency. Inspection must be supplemented by the power to prevent the entrance of infested products.

To show you how important the matter of inspection of interstate shipments is let me tell you of one case only: Last year there was shipped into the State of Maryland grapevines from a western nursery that were badly infested with the grape phylloxera, that pest of the vine that has caused untold losses both in foreign lands and in parts of this country. Maryland has never suffered from this pest, but if we have not the power or funds to inspect and reject interstate shipments she may have to suffer like others have.

This is one of the things that you should consider carefully: Are we going to continue to jeopardize our interests by not insisting on more rigid statutes concerning the control of insect pects?

In conclusion I want to mention briefly some of the more important outbreaks of insect pests that have occurred in Maryland during the past year.

The army worm (Leucania unipuncta Haw.) appeared in various sections of the State in great numbers, destroying grain and forage crops and being particularly abundant in and around Baltimore. The first brood was not injurious; the second brood proved very injurious about the last of July. Information concerning the method of preparing poison bran mash was sent out to all the newspapers. In Baltimore city, with the co-operation of the Baltimore Sun and the Roland Park Improvement Company, we were able to check the ravages of the pest and save many lawns. We used 1 pound paris green to 50 pounds bran or middlings moistened with one gallon cheap molasses and water sufficient to make a crumbling mass. This was scattered broadcast about sundown. In several sections of the State where the second brood was not controlled the third brood proved injurious.

The Hessian fly (Cecidomyia destructor, Say.) continued injurious in Maryland. In Frederick County one farmer observed our directions concerning the safe sowing date, but his neighbor planted his wheat early. May 18 we received specimens of the wheat from the first farmer. It was badly infested with fly larvae, though the farmer stated that it was entirely free the previous fall. Just an example of what may result from lack of co-operation.

Two new records of injurious insects on wheat were received by me—one the wheat stem saw fly (Cephus pygmaeus L.), the other the wheat stem maggot (Meromyza americana Fitch)—both of which under favorable conditions are liable to do serious damage.

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Corn root web worms (Crambus sp.) and wire worms did considerable injury to cron in the vicinity of Elkton during July. Rotation of crops and fall prowing are the methods of control of these pests. In so far as possible, do not plant corn land previously in sod.

A common fruit tree insect seems to be on the increase. This is the trumpet leaf miner of the apple (Tischeria malifoliella), which destroys considerable of the leaf area. Thorough poison spraying throughout the season and early cultivation of the orchards will help to keep this pest in check.

The woolly aphis continues to be one of the most injurious apple pests. We have been working on this pest for many years testing various insecticides. The one that gives the most promise is pine tar creosote, either undiluted or in emulsion made with caustic soda. This should be sprayed about the bases in trenches with a radius of about 3 feet and a depth exposing the roots.

We have in the course of our investigations noticed that a small yellow ant is caring for and transporting the lice from place to place. This discovery may have important bearing on the control of the pest.

Incidentally another factor came to light in the investigation. Paradise stocks in our orchards seem to possess a considerable degree of immunity.

The most important insect of the year is the California Pear Thrips (Tacuiothrips pyri, Daniel). This insect was discovered in an orchard near Baltimore. Heretofore this insect has only been found in England, California, and the Hudson River Valley. In California the insect does about $1,000,000 damage annually. The insect lives over winter in the soil and attacks the buds just as they are opening, rasping the surface to such an extent that sap exudes and the fruit does not set, the blossoms having a blackened and shriveled appearance. The insect is quite small, being about one-sixteenth of an inch in length. The adults begin to lay eggs soon in the tissues of the blossoms and in the fruit stems. In a short while the young hatch and their injury is almost as severe as that of the adults. In a few days, however, they enter the ground, remaining there ten months.

As the greatest and most important injury occurs just before the blossom unfolds it is absolutely necessary that spraying be done at the time when the bud clusters begin to unfold and before the blossom is completely open. Poisons are of no use; spray with kerosene emulsion plus 40 per cent nicotine. Use 4–5 pounds soap to every 100 gallons of spray, 3 gallons of kerosene, and three-fourths pint of 40 per cent nicotine. Two or three sprayings will be necessary to control the pest.* I will be glad to receive any branches of blossoms that show blackened and discolored flowers or leaves, with the edges curled and blackened like frost injury produces, from any section of Maryland.

The 12-spotted cucumber beetle did considerable injury in the college orchards to young peach foliage and buds.

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*Bul. 343, N. Y. Agr. Exp. Sta.

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Three insects were very injurious to beans—a snout beetle (Sitones hispudula Fabr.) to newly planted lima beans at Easton, the bean maggot (Pegomyia fusiceps Zett.) to lima beans in Anne Arundel County, and a little leaf-eating beetle on wax beans at college. This beetle bears the technical name, Cevatoma trifurcata Fors.

The rhubarb weevil (Lixus concavus Say.) was very abundant at college, but its injuries were not serious.

An insect that injured roses extensively was a little green beetle that fed on the buds and leaves, known as Nodonota puncticollis Say.). This can be controlled by spraying with paris green or arsenate of lead.

Don't fail to make use of your experiment stations. What may seem an insignificant outbreak may have serious possibilities.

To be successful in insect control requires constant vigilance, prompt action, and thoroughness.

HOW TO RAISE MORE FRUIT AND LESS WOOD.

H. A. HUSTON.

The production of fruit is quite a distinct process from the production of the tree that is to bear it. Most of the directions which we find for orchard work are really methods of producing trees and would be quite as applicable to forestry as to orcharding. They produce trees, but delay fruiting. Every grain farmer knows that excess of manure produces too much straw in proportion to the grain, and that the nitrogen in the manure is the cause of this. The same thing happens in most orchard work, although the reason is not always quite so apparent. Clean culture with its frequent cultivations, mulching, and turning under of cover crops all tend to make nitrogen available more rapidly and continuously to the tree, and hence to produce a rank growth of wood that ripens late and immature fruit buds that will not withstand the winter. Such trees come into bearing late. When the owner wishes to hasten the fruiting he is too often told that manure is the best fertilizer for trees and proceeds to add it and with it more of the very material the excess of which has caused the trouble which he is seeking to correct. Instead of causing the tree to set fruit he only secures a more rank growth of wood and foliage and a correspondingly greater liability to fungus diseases. Were it not that nature carries much of the additional nitrogen away in the drainage water the effect on the trees would be even worse. Much of the nitrogen supplied in the manure applied on orchards that are already making sufficient wood growth is a dead loss and would have been used to for better advantage on some other crop.

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In old times the grain grower often put salt on the rich bottom lands to stunt the growth of the wheat straw and prevent lodging. Today we do better. We balance the nitrogen by the other plant foods and use the valuable nitrogen instead of stunting the plant so that it can not use it.

TWO STAGES IN ORCHARD WORK.

In the orchard there are two distinct periods—one the production of the tree when the usual cultural methods may utilize the soil's store of plant food to good advantage and develop the tree as fast as it should grow; but the production of fruit introduces another phase of the tree's existence when the food requirements are quite different.

The Geneva (N. Y.) Experiment Station has shown how many pounds of each plant food each part of the tree and the fruit takes from an acre of land each year:

	Nitrogen.	Phosphoric acid.	Potash.	Lime.	Magnesia.
Apple:					
Fruit	20 pounds	9 pounds	44 pounds	5 pounds	6 pounds
Wood and leaves	31 pounds	5 pounds	11 pounds	52 pounds	17 pounds
Total	51 pounds	14 pounds	55 pounds	57 pounds	23 pounds
Peach:					
Fruit	17 pounds	9 pounds	36 pounds	2 pounds	4 pounds
Wood and leaves	57 pounds	9 pounds	36 pounds	112 pounds	31 pounds
Total	74 pounds	18 pounds	72 pounds	114 pounds	35 pounds

It will be seen that the fruit makes much heavier demands than the foliage and the wood, and that the proportions of the materials in these are qiute different.

The peach is shown to be by far the most exhaustive of the fruit trees. The need for rational feeding of peach trees is further emphasized by the fact that most peaches are produced on land that is but poorly supplied with available plant food. This is especially true of the sandy soil of the peach-growing section where the lack of potash and nitrogen is so well known, and if the lands have been previously cropped the phosphoric acid supply is often in need of replenishment.

Moreover, while producing this fruit the tree must be making good, strong fruit buds for the future crop. If there is not enough plant food of each kind available at the right time, then the fruit and foliage use what there is at the expense of the buds and the next season is an off year from such trees.

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TO HASTEN THE BEARING.

Young orchards which are making a very vigorous growth generally come into bearing later than the owner wishes them to. To hasten the bearing period one should begin to balance the ration about two years before one aims to bring the trees into bearing. To do this apply in the spring or just before the last cultivation in the summer 250 pounds per acre of 14 per cent acid phosphate and 50 pounds per acre of muriate of potash. Do not put any of this material within 2 feet of the trunk of the trees. When the trees are in full bearing, especially on light soils, the amount of muriate of potash should be 100 pounds per acre. On most orchard lands the cover crop or weeds, clover and grass that grow up when cultivation ceases in the summer will supply the necessary amount of humus and nitrogen. But if decreasing vigor of the tree and light-colored foliage indicate need of nitrogen the immediate needs of the orchard may be met by the broadcasting of 200 to 300 pounds of nitrate of soda per acre after the trees bloom and the future needs may be met from a clover or pea crop turned under or from the application of eight or ten tons of manure per acre once in five or six years in case the ground is too much shaded to permit the growing of leguminous crops.

Even one year gained in bringing trees into bearing is of importance and if you can make the trees produce from 100 to 200 bushels per acre a year sooner than they otherwise would, it is well worth the expenditure of from five to ten dollars per acre.

The good may die young in the books, but we do not desire this in the orchard. Most peach orchards starve to death at an age when they would yield their best crops if properly fed. What would it mean to you to bring your trees into full bearing two years earlier, to prolong their bearing period to twenty years and to produce fair crops in off years and maximum crops in good years? It has been done with peach trees and you can do it. On the lightest sandy soil the nitrogen supply may have to be supplemented by small annual applications of nitrate of soda from 100 to 200 pounds per acre, and for the first two or three years more phosphate and potash may be used until a real reserve of each has been provided. The excess of phosphate and potash will not leach out.

In sections where wood is inclined to mature rather late it is better to feed the trees with nitrogen only during the early part of the growing season. Where nitrate of soda is used the nitrogen is immediately available and is used at once; the same is true of blood, good grades of tankage, and ammonia salts. Such compounds as horn shavings, leather scraps, wool waste, and manure continue to yield nitrogen gradually throughout the season, and hence tend to delay the ripening of both wood and fruit. This may be overcome to some extent by stopping cultivation early in July and letting volunteer growth use up the nitrogen that becomes available during the late summer.

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PROFITS, NOT NECESSITY, THE GUIDE.

It is quite true that there are many young orchards that have come into bearing reasonably early and have yielded fair crops every other year, and in some cases every year, for eight or ten years. Such cases are often cited to prove that rational feeding of the orchard is not necessary. One of America's best-known apple growers had just such an orchard and firmly believed that a balanced ration was not necessary. After producing a series of profitable crops he found first the size and next the number of fruits falling off, and two bad years of this sort started him on an investigation to find out not whether balanced rations for the orchard were necessary, but whether they were profitable. And this is the sum of the whole matter. Each one of you is, of course, privileged to use your orchard for a wood lot or a shade park if you wish. But if you seek to get the most profit from the orchard consistent with maintaining its productiveness, then the orchard must be furnished with

The right things, in
The right forms, in
The right amounts, in
The right way, in
The right time.

The suggestions above have shown these for average conditions, but soil, crop, and previous treatment must be considered in making the most profitable use of materials.

The vigor of the tree and its foliage will give us a rough idea of the need of more nitrogen. On clay soils the acid phosphate may be increased to 300 or 400 pounds per acre for the first few years and reduced to 200 later on. On lighter soils the potash may need to be increased as the orchard advances in years.

Good clay soils often accumulate potash enough for a few crops because the phosphate in such soils is so low as to limit the crop. On such soils the use of phosphate for the first few years seems to be the only thing that is profitable. But potash is being removed faster than it is becoming available and the gypsum (land plaster), that is a necessary part of the acid phosphate, releases more potash from the soil, and so the exhaustion of potash proceeds almost unnoticed. If the soil's supply of potash capable of being released in this way was any considerable fraction of the total amount of potash in most clay soils, then this indirect method of securing it could be continued. But only a very small fraction of the total potash of the soil can be made available by such means, and when this small fraction has been used there remains only the potash in the most resistant of the soil minerals, such as feldspar, which can not by any known economical means be rendered available fast enough to furnish sufficient food for the orchard's needs.

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On lighter soils and on black lands the benefits of potash salts alone are often even more conspicuous than those of phosphates on clay. Real limestone lands often contain a great store of phosphate that becomes available fast enough to provide the phosphate supply for the full life of the orchards; but on sandy and black lands even where potash at first seems to be the only profitable material the condition of the orchard should be carefully watched and a trial row treated with phosphate as soon as any indication of trouble appears.

Off years are due quite as much to starvation as to climate. We have learned how to combat the fungus and insect enemies and how to conserve the moisture. Rational feeding of the orchard will bring more constant bearing, healthier trees, much longer bearing period, and higher quality and greater quantity of fruit at a cost that is quite insignificant compared with the return received. Try it.

A COMPARISON OF EASTERN WITH WESTERN HORTICULTURE.

PROF. C. E. TEMPLE, Maryland Agricultural College.

It is with a keen sense of pleasure mingled with a feeling of responsibility that I come before you in an attempt to draw a comparison between Eastern and Western horticulture. All of you are more or less familiar with the beautiful fruit produced in certain orchard districts of the Pacific Northwest; you find it here, but not in competition with your own; and you find it on our markets where it commands generally a much higher price than our finest grade. If you took the trouble to investigate, you would find these wonderful fruits in the markets of almost every city and town of the United States and in all of the important apple markets of other countries. The very fact that your own fruit is in competition in the world markets with such remarkable fruit should stimulate in you a desire to know the secrets in the production and the marketing of your competitor's product. It is with the hope that I may give you some of these secrets that I may help you to better understand your own possibilities for fruit production that I have ventured to take your time.

In passing I may add that I have spent the past three years in the Pacific Northwest, where I had an opportunity to become familiar with the orchard practice and methods of marketing that obtain in that region. I have also been able to study your own orchard conditions here. Since coming here last September I have spent practically all of my time investigating conditions in your orchards and in your truck gardens. I have been on the go almost every day, making a special study of the apple and peach orchards in almost all parts of the States here represented. Let us now proceed with our comparison,

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confining our remarks mainly to the apple industry as it exists in the East, especially in Maryland and in the Pacific Northwest.

LOCATION AND SIZE OF ORCHARD.

The location of the orchard in the West is very important. There are really only very few regions in that country where the apple has become famous for its superior form and good quality. On the other hand, there are many places out there where this fruit is only of mediocre or even of poor quality. The latter cases usually result when either poor judgment as to the requirements of the apple or a "wild-cat" orchard scheme is back of the orchard project. It is with no little regret that I call your attention to the fact that a large amount of money has been squandered on these ill-fated orchard lands by Eastern people, mostly from the cities and inexperienced in the arts of orcharding. All the more regretful is it when we learn that these same people could have secured good orchard land in the East at one-tenth to one-fourth the price paid for the western land. Then, too, they would have been more than 2,000 miles nearer their markets and free from the burdens of irrigation.

On the other hand ,there are some good orchard regions in that country, and I may mention the following as being among the best: Hood River and Rogue River Valleys, Oregon; Wenatchee and North Yakima, Washington, and Lewiston Orchards, near Lewiston, Idaho. Each of these orchards is several miles in extent and all of them are cut up into small tracts of 5 to 40 acres, occasionally more. These small tracts are owned by separate individuals, who live on them and give their undivided time the greater part of the year to their orchards. It is important to note this fact, as it is one factor that contributes largely to their success. Here in the East a man with as much as 20 acres of orchard gives the greater part of his time to general farming or to something else. The orchard appears to be of little consequence. It is therefore often put on the poorest soil of the farm, regardless of whether or not this happens to be on a site favorable to fruit groming. When planning a good commercial, western orchard special attention is given to air drainage as well as to soil drainage, which is inseparably connected with irrigation. Irrigation is considered by many as being essential to the production of fancy apples. So essential is it considered by the inexperienced buyer that one certain orchard company, although located where it was not at all necessary to irrigate, had to construct irrigation ditches in order to sell its orchard tracts. There are, then, relatively few extra good orchard regions in the West. The individual orchards are small The slope or exposure most favorable to the orchard depends upon air drainage, protection from severe winds and untimely frosts, etc., peculiar to the orchard region.

VARIETIES.

Let me refresh your memory on the fact that all varieties do not do equally well in all locations, and that it is a big problem for the practical grower and

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the scientist alike to determine which varieties are the best suited to any locality. There are some varieties, as the Grimes Golden, Jonathan, and the ubiquitous "Ben." that have been planted everywhere, but with varying profit. The Jonathan of the West is just as beautiful as the Jonathan of the East, but the eastern fruit is much superior to the western from the standpoint of flavor. This is true also of a number of other varieties. However, the Stayman and Delicious seem to be exceptions. The Stayman is more highly colored in the East than in the West, but equally highly flavored in both sections. The Delicious of the West, so far as my experience goes, is superior in form, flavor, and color to the Delicious of the East. It is no secret, even in the West, that the flavor of the eastern apples is, in general, superior to the flavor of the same varieties in the West. Many times I have heard westerners express a desire to taste once more an eastern apple. You have, then, in your apples superior flavor, equally good color, and normal size. There is, however, another point that deserves notice here. In the West the commercial orchards include only very few varieties, usually one to four. It is important to be able to ship whole cars of any one variety, and it is best to put in any one car only one grade of a variety. In the East the practice seems to have been the reverse; the more varieties in an orchard the better it is. This would seem to be a mistake except in family orchards and in those orchards where the fruit is disposed of locally, in which cases varieties ranging from the earliest to the latest might be desirable.

CARE OF THE ORCHARD.

A mraked contrast has been observed between the orchards of the East and those of the West as to cultivation, pruning, spraying, and thinning. In the West the orchard is cultivated many times every year, except when a cover crop of alfalfa or some other legume is grown. In the East, so far as my observation goes, this practice is unusual. On the other hand, it is a common practice here to allow grasses to form a tough sod in the orchard or to let the orchard grow up in weeds. This is certainly a very bad practice. If the orchard can not be cultivated regularly both ways and up to the trees, it would be much better to seed it to alfalfa or clover. No commercial fertilizer is used in the western orchards and I doubt if any would be required in the eastern orchards if proper management of the soils as to cover crops and tillage were practiced.

In regard to pruning, I have observed that the eastern orchardist prunes his trees from below upward, if he prunes at all. He therefore removes the fruit spurs and twigs from the larger branches. These are important for fruit production from the western viewpoint, as they will bear good fruit for many years if the tree is pruned so that the light can get to them. The western orchardist prunes his trees from above downward, keeping his trees low and open at the top. This type of tree has many advantages over the tall tree, which bears its fruit away out on the slender branches.

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Another important factor in the production of the western apple is the control of the insect pests and plant diseases. The necessary sprayings, which vary with the orchard and with climatic conditions of the various sections, are given. There is also a continuous war waged against blight. This seems to be their worst apple disease. This disease is kept under control by cutting out and burning the cankered branches in the winter or early spring and the diseased twigs during the growing season. Care is taken to cut well below the diseased portion of the branch and to sterilize the pruning tools after every cut. Blight is also one of the worst diseases here in the eastern orchards, and, what is worse still, little or no effort is put forth to control it. I have found some very good apple orchards here with old, cankered, half-dead pear trees standing near by. The blight organisms pass very readily from such trees to the apple trees, especially at blossoming time, as they are carried by insects. The diseased pear trees must be cut out and the blight must be held in check if our apple orchards are to be very profitable. The profits in the East are still further reduced by several other diseases. Among these are cedar rust and bitter rot, which are very conspicuous and destructive, whereas these two diseases are very inconspicuous or almost absent from the western orchards. The absence of the red cedar from the orchards in the West controls the rust and the presence of cool nights in late summer and fall prevents the bitter rot from doing much damage; however, I have found the scab worse in certain localities of the West than in the East. Scale, codling moth, curculio, and aphids are prevalent in the West as well as in the East. There are, then, sufficient insect pests and apple diseases in both sections of the country to require careful and regular spraying for the production of good fruit.

The thinning of the fruit is just as important in the production of fancy fruit as cultivation, pruning, and spraying. Careful thinning makes larger fruit possible without reducing the yield. It increases the color; it eliminates the faulty fruits; it reduces the cost of harvesting; it reduces the chances for brown rot in peaches, and it makes possible a crop every year in those apple trees that are inclined to bear only every other year. Thinning should be done after the June drop, and some thin again in August. The distance to leave the fruits varies with the variety. With the medium-sized varieties of apples they are thinned, as a rule, to 6 to 8 inches apart on the twig. In the West thinning is a regular practice; in the East it is the exception. I have found no one here in the East who has made it a practice to thin apples, but there are a few who are thinning their peaches at a good profit for their trouble.

PICKING AND PACKING.

This is probably the most important operation in the fruit business. It is very important to pick and pack fancy fruits without bruising them. This is all the more important in the West owing to the fact that the fruit has to be shipped long distances. I have found one man here in the East who makes it

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a practice to shake his apples from the trees and put them on the market the next day. This man has approximately 100 acres of apples, but the apple business with him is a secondary matter. He is in the trucking business on a large scale. This kind of marketing is dangerous to the industry. It is sure to result in a decrease in consumption on account of the inferior quality of the fruit and a decrease in the average price paid for the fruit. You of course know that this is not the general practice among our best fruit men, but I wish to call your attention to the fact that the pack put up in the East is much inferior to the pack put up in the West. Out there the apples are graded as to size, color, and freedom from blemishes of all kinds. The best grade is wrapped in soft paper, which bears the name of the grower, and the fruits are packed in uniform boxes, which hold approximately a bushel. These boxes are labeled with the name and address of the grower, the variety and grade of the fruit, the number of apples in the box, and occasionally with the time when the apples within should be in prime condition to be used. If every grower would put this last item on his pack, whether it be box or barrel, I believe the consumption of apples would soon be greatly increased. People want fruit when it is at its best and they are willing to pay for a fancy pack. Then, too, the time is just about past when one can put all kinds of apples into the same barrel and sell them at a profit. We are greatly in need of an honest, dependable pack.

MARKETING.

In the beginning the western growers marketed their fruit individually, just as the eastern growers do now. They soon had to abandon this method, as they were competing against each other, and, too, they had no way of knowing how many cars were shipped to a certain market at any given time. This crude practice resulted too often in the overstocking of some markets while others were without fruit. The growers, therefore, formed local organizations for disposing of the fruit. The forming of these did not effect a complete remedy, as there were a great many of these local organizations and there was keen competition between them just as there had been before between the individual growers. In 1912 a move was instituted to combine all of these local organizations, which numbered now more than a hundred, into a central selling agency known as the North Pacific Fruit Distributers. This organization has done an immense amount of business and it has done it in a very businesslike manner. During the busy season it receives daily reports by wire from all of the important apple markets. Whenever any market is strong rolling cars are diverted toward it, and whenever a market is reported weak the fruit consigned to it is either put in storage or it is diverted toward a more promising market. This system would be next to ideal if all of the growers belonged to this central organization, but unfortunately they do not all belong to it. Consequently there are still some independent organizations and a few individuals still in competition with the central organization and with each other.

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As for the eastern growers, it seems that they, too, must some time organize unless the individual grower has a large acreage. The small growers in the future will be compelled to unite in order to compete with the large growers. The sooner they get together in their respective communities the better it will be for them and for the apple business generally.

SUMMARY.

It has not been my purpose here to encourage extensive planting of apple orchards in the East, but rather to encourage better methods in caring for the trees we have already. If the best methods known to horticulture and modern methods of marketing were to be applied to the apple industry of the East for the next ten years, the East would surpass the West not only in the production of fancy fruit but also in the control of the markets. The East, in my judgment, is much better fitted than the West to take the lead in this great industry. It can fulfill all the conditions of nature in the production of delicious, highly colored apples of normal size and free from the injuries of insect pests and diseases; it has the big markets of the Continent in its midst; it has relatively cheap land that is ideal for fruit growing but not at present producing large returns; it has the unskilled labor of its many cities at its command; and it has the best transportation facilities in the world, not only to its immediate environs but also to foreign countries. Notwithstanding all of these advantages two things are lacking: First, skilled laborers to plant our trees, to till the soil about them, to prune them for the best production possible, to spray them thoroughly at the exact times needed and with the required materials, to thin the young so that the culls may not use the food that should go to the select, to pick the fruit, to pack it attractively, and to train others in all of these various operations; and second, intelligent orchard managers with keen business ability and with an appreciation for profit in commercial orcharding.

Mr. Slaymaker—To what extent do they spray in the West?

Professor Temple—Spraying is a regular practice in all of the western fruit districts. They have to spray for scale, codling moth, aphids, scab, and various other pests.

Mr. Huston—You have an excessive amount of sunshine; we can't come up with it.

Professor Temple—We have enough here to give the highest color and the richest flavor. What more could you desire?

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WHITE POTATOES.

F. J. DUKES, Girdletree, Md.

In making a report on this important crop of the lower Peninsula I shall be compelled to go back to the fall previous in order to touch on the first and very important step in white potato growing, namely, the seed question. Every grower should put forth an extra effort to secure selected No. 1 stock, true to the variety. The fall is the time when most of our seed potatoes are brought in from the north, They can be bought then for about half the price usually charged in the spring. Also, another advantage in buying in the fall is that you can visit the fields and make a field selection. For my own personal use I had much rather have home-grown seed that are grown from Maine cold storage seed, which gives us a more uniform potato, and by selecting your seed stock you get a crop truer to name than you would by depending upon the other fellow to do it for you. The planting of the crop would necessarily cause us to go back for a period of one, two, or three years and consider crop rotation, such as scarlet clover, red clover, or cowpeas. Any of these plowed under 5 to 6 inches deep and thoroughly pulverized will give us a good seed bed to begin with. We plant with the Robins improved potato planter, which gives better results than any other planter used in our section. We plant at the distance of a 34-inch row and space the potatoes 15 inches in the row, drilling in 1,200 pounds of fertilizer per acre in the drills. This fertilizer is 7–6–5, which gives better results in our section than any other fertilizer. Cultivation begins immediately after planting and continues up to within about three weeks of harvest. For our spraying we use atomic sulphur and arsenate of zinc powdered. We harvest with the digger and pay our help by the hour, which is more satisfactory than paying them by the barrel, as the potatoes are graded very much better. Our crop is all packed in barrels and loaded in cars of 175 to 200 barrels per car, and put up for the high dollar, which is much better than to chance the market. We sold potatoes last season f. o. b. Girdletree for more money than they would have brought us if sold in New York city. Pay attention to the marketing of your crop.

In conclusion, to grow and market potatoes successfully one must be thorough in every operation from beginning to the end.

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SWEET POTATOES.

W. B. GORDY, Delaware.

The fact that soil, climate, and conditions on our Peninsula are so admirably adapted to large yields of sweet potatoes has caused the acreage to increase very rapidly. From 1885–1890 there was scarcely a car of sweets shipped from our station—Laurel, Del. Last season during the fall and spring there were 1,800 to 2,000 cars shipped from Laurel, hence you can readily see how sweet potato culture has increased in some parts of our Peninsula.

It is estimated that in 1913 the area of sweet potatoes in the United States was 625,000 acres. From data obtained the 1912 crop of Delaware was placed at 600,000 bushels, a yield of 120 bushels per acre, at 80 cents per bushel, and valued at $480,000. In 1913 the crop is estimated at 675,000 bushels, a yield of 135 bushels per acre, at 60 cents per bushel, and valued at $405,000. In 1914 the crop is estimated to be 600,000 bushels, an average yield of 100 bushels per acre, estimated to be worth 90 cents per bushel, and valued at $540,000. We are inclined to think that the 1914 crop will exceed the above estimate.

The practice in vogue among sweet potato growers in selecting seed is to use the smaller-sized roots, called "seconds," for seed. Generally no selections are made from high-yielding hills nor from plants absolutely free from disease. At harvest and at digging time the "prime" potatoes are picked first and stored away for market. After this is completed we then gather the "seconds" for seed. These seed are often gathered by the help we use in digging sweets, who have no interest in their cleanliness. It is readily seen that the "seconds," as they are picked at random, really represent the inferior quality of the crop. Assuming that like begets like, the crop soon runs out by the continuous use of inferior seed. Selection and improvement is the privilege of every man who propagates his own seed. No other plants so readily permit of such improvements as those perpetuated by roots, tubers, and cuttings. The highest possibilities of a sweet potato strain are easily obtained by selecting at digging time the roots from these hills which are ideal in the production of the proper number of "primes." Now, place these roots away under the most favorable storage. In the following spring take these selected roots, and, after discarding all specimens showing disease, treat for disinfection.

After careful selection the seed are soaked from 5 to 10 minutes (not longer, as injury may result) in a solution of corrosive sublimate (also known as bichloride of mercury, a strong poison), made by thoroughly dissolving 1 ounce of the chemical in 8 gallons of water. Following the treatment the seed should be early bedded to prevent infection.

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The preparation of the seed bed and the planting of the seed potatoes is a question of sufficient importance to justify our going into it in some detail. Selection and treatment will be of little value if the soil in the seed bed, through negligence, is filled with all the diseases to which the sweet potato is heir. Clean out the infected soil and use fresh dirt. Drench the frames and bed with a solution of formaldehyde, using 1 pint to 30 gallons of water, drenching the soil at the rate of 1 gallon per square foot of bed surface. This treatment should be carried out at least two weeks before bedding, thus giving time to allow the formaldehyde to evaporate. Such soil treatment is to be recommended even when fresh dirt is used. The formaldehyde treatment will not kill the parasitic fungi which are internal of old roots found in old dirt, hence the reason for changing soil.

METHODS OF BEDDING SEED.

We usually get cornstalks and put them in the bottom of the bed, then wet and pack them good and tight to the depth of about 6 inches, then put hot, fresh stable manure (wet) about 6 inches deep on the stalks, cover manure with good soil, which is obtained by digging sand from the woods or some secluded spot where sweets have not been grown or deposited.

The seed should be graded—that is, the small ones should not be put in the same bed as the larger ones; if so, when covering, the small seed will be covered too deep. We cover the seed with about two inchs of soil. This being completed the bed or beds may then be covered with glass or oiled muslin. I do not like plants of a fire bed, as they are spindly and not so free from diseases. The heat in forcing the plants seems to absorb the moisture of the seed and it does not leave enough vitality in them to make a strong and healthy plant. For purposes of vigorous sprouts the seed should not be placed too close together, thus allowing the plants plenty of room to grow. The sprouts should be allowed to remain in seed bed until they become strong and vigorous, as small, spindly plants are more apt to die, and should they live are more susceptible to diseases. A good, tough, strong plant means much in getting a perfect stand. Never replant where the plant dies of disease. It is better, if possible, to bed enough seed to obtain all seed plants needed the first drawing of plants. We sometimes draw from the bed two or three times, especially when slip seeds are used.

Sweet potatoes thrive on quite a variety of the soils of our Peninsula, although sandy land moderately supplied with organic matters seems the best type for this crop. I have seen them grown very successfully in rather heavy soil. In storage they do not keep so well grown in heavy soil, nor do they possess the same eating quality as when grown in light, sandy soil. Some lands that have been run out for other purposes, when properly fertilized, make profitable yields of sweet potatoes. Soils should be thoroughly prepared, plowed shallow, about two or three inches deep, and kept well cultivated until plants are set.

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The sweet potato removes a comparatively small amount of nitrogen, phosphoric acid, a larger amount of nitrogen, and a very large amount of potash from the soil. Last season I used 2–8–12, about 1,200 to 1,500 pounds per acre, drilled in the soil; about one-half with my wheat drill, the other half I put on the surface. By means of improved machinery the crop can now be grown much cheaper than in former years. As, for example, we used to plant one acre per day with the help of four men and one horse. Now we plant four acres per day with the help of three men and two horses. This method applies to the use of transplanters, which are very commonly used in sections where sweets are grown extensively. Some growers prefer digging the land and using a small hand planter or setter, which perhaps most of you are familiar with. I prefer using a corn marker to mark out the rows and plant on level surface, applying the fertilizer just before planting.

CULTIVATION.

Soon after planting it is best to cultivate shallow to form a soil mulch and conserve the moisture, throwing a little dirt to the plants. Regular cultivations after each row are necessary, and during a dry time they should be regularly cultivated to keep the soil mulch, so that the loss of moisture may be prevented. Two or three hoeings are necessary with some grounds. In our vicinity we have discarded the hoeing, and instead use a wheel hoe fastened behind a sulky cultivator. One man rides and operates the cultivator, the other man walks and works the wheel hoe. By this method of cultivation it enables us to produce the crop much cheaper than in former years. Usually help is scarce and high at this season of the year, and discarding the hoeing of the plants greatly facilitates the work of growing sweets.

Last season we grew 25 acres, and with two men and a pair of horses were able to cultivate and weed the 25 acres in four days. After the vines form enough to cover the ground we discard the wheel hoe and then pull the grass and weeds as they may appear. Another loss in hoeing is the disturbing or cutting the small tubers from the hills. Most of the labor we hire would rather cut the grass from the hill with the hoe than pull it out, hence in doing so injure the small potatoes. The cultivation should continue as long as the vines have not run to such an extent that it is not impractical. When the vines show some of the different diseases, such as black rot, stem wilt, the hills showing any of the above diseases should be dug out at once and carried from the field and burned. The stem wilt as well as black rot are very contagious and often if left to remain in the field inoculate the healthy plants near it. We should be careful to use every effort to eliminate all diseases. Another feature of the stem wilt is that after the vines die the potatoes continue to grow, and oftentimes grow large enough for "seconds" or seeds, so you can readily see the advantages derived by destroying the disease as soon as noticeable.

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VARIETIES GROWN.

In some parts of our Peninsula the "Big Stem Jersey" is grown almost exclusively where they grow for early market. The objection to this variety is the enormous size. Also they do not carry well in storage. The size may be reduced by planting close in the rows, say about 12 to 15 inches. The "Up River," "Big Leaf," and "Carolina" are mostly grown for storage. The three varieties mentioned above grow chunky, not so large as the "Big Stem Jersey." "Gold Skins" also keep well in storage. The "Up River" varieties do not yield as heavy as the "Big Stem Jersey." They set more to the hill and should be planted about 24 in the row. The production of sweet potatoes in a great measure is in its infancy. In many of our large cities they are regarded as a luxury and not as a food. The demand increases more and more each year. Where they can not be shipped otherwise, they get them canned. In view of the great need which confronts us in the sections where sweets are grown extensively, of a cheaper and more productive carbohydrate than corn, feeding stuff analyses of some of the different varieties indicate that sweet potatoes are good substitutes for corn. While there would be a great deal of trouble in keeping sweet potatoes the whole year round, yet they could be fed during the fall and winter months; and even when there is a good market the scarred ones and culls could be fed to good advantage. Diseased potatoes should be boiled before being used for stock food. All kinds of stock seem fond of them and they possess a great advantage over root crops in that they contain as high as 37 per cent of dry matter. For starch and feeding purposes some varieties are better than others.

HARVESTING THE CROP.

We usually begin digging for storage about the 20th of September; that depends, of course, upon the amount of acreage. They carry better in storage when dug before the fall rains and frosts kill the vines. If possible, when digging for storage dig early. Great care should be used not to bruise or skin the potatoes when digging and storing. The storage house should be well cleaned and fumigated with sulphur or formaldehyde before filling with potatoes. When filling, and during the sweating or drying process, thoroughly ventilate when the weather will permit. It is much better to use a small hygrometer in each room of the storage house, also one on the outside of the house.

When the air on the outside is more moist than on the inside keep the house closed except the top ventilators. Do not overcrowd the house; better ship or sell a part than to fill the house top full. Be sure to collect all culls, as they have value as feed; also, if left to lie in the ground they will retain diseases. Rake and burn the vines.

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CANTALOUPES.

IRVING CULVER, Delmar, Del.

I have been identified with the development of the cantaloupe industry as a grower and distributor since the first car was shipped from this Peninsula. I have endeavored to cover the subject in all its phases in a plain, practical manner. However, there are so many elements that enter into the production of a cantaloupe crop that it is impossible to lay down fixed rules to fit the various climatic conditions, the different soils, the numerous diseases and pests, and the many conditions not under the control of the grower; yet almost without exception we find that those who have different ideas about some agree that pure seed, proper soil, thorough cultivation, and quick, careful, intelligent handling are necessary.

CLIMATIC CONDITIONS.

The cantaloupe is quite successfully grown in nearly every section of the United States. It is naturally a hot, dry-weather product, but will grow under other climatic conditions but will lack that supreme quality—flavor. Too much rainfall and heavy dews during the maturing season will invariably start fungus diseases, rusts, or blights, which are quickly noticed by the insipid flavor and soft, spongy condition of the cantaloupe.

SOIL AND FERTILIZERS.

Almost any soil on this Peninsula seems naturally adapted to the producing of a good quality of cantaloupe except the heavy clay and extremely sandy soils. The cantaloupe thrives best on a well-drained sandy-loam soil. Clover sod, rye sown in the fall and turned under in the spring, and cowpeas have shown good results. Well-rotted barnyard manure has generally given better satisfaction and results than commercial fertilizers.

The cantaloupe seems to produce better on a medium fertile soil. If too much fertilizer is used, the vines grow very rank and the melons are likely to be oversized and poorly netted, the flesh coarse, and the product generally of poor quality. If planted on poor soil, the melons are undersized and the yield light. The size of the melon is undoubtedly governed by the fertility of the soil as well as by climatic conditions. Crop rotation is essential to retain the necessary plant food, and is a safeguard against disease, infected soil, and insect pests.

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PREPARING THE SOIL.

In preparing the soil ever bear in mind that the cantaloupe should be planted and cultivated as a garden crop rather than as a field crop. It will not respond readily to rough treatment usually given to general field crops. The grower will be well repaid for the extra labor and time consumed in the thorough preparation of the soil. Select, if possible, suitable land, sloping to the south or east. Such land warms up quickly in the early spring, and is preferable where an early crop is desired.

If plowing is done in the fall, plow very deep; if in the spring, plow only as deep as the land has been plowed before. If the land is inclined to be cloddy and dry out quickly, when a few furrows have been turned the harrow should be used, first with the teeth set straight to stir as deeply as possible, then slant the teeth to level and pulverize the soil. If necessary, follow with a float or leveler thoroughly to fine and slightly pack the soil, to aid in retaining the moisture. The land should be prepared and allowed to settle a few days before planting. If the land is to be cultivated both ways, mark off in rows 4 to 5 feet apart each way, and if in the drill 5 feet is the proper distance.

One of the most important factors in the production of a cantaloupe crop of high marketable character is good seed. The soil and all other conditions may be ideal, but with poor or mixed seed, time, labor, and profits are lost. Therefore, buy the best seed you can get, regardless of the cost. It is better to pay $5, or even $10, per pound for seed of known quality than to pay 50 cents a pound for a poor quality and have the larger portion of the crop unsalable. There are some growers on this Peninsula who are making an honest, conscientious effort to save seed from their own growing for the following crop, but it has been repeatedly proven that Colorado seed are superior to our own saving. However, I believe with proper care good seed can be saved from our own patches, but not by shipping the first, best melons and saving seed from the culls. During the period when seed should be saved cantaloupes bring the highest prices. Many melons that will do to ship can not be saved for seed, for in best-bred strains and under the best conditions the melons will vary in size, form, and density of netting. Above all do not place your seed order with the parties who may quote you very low prices, for it costs money to produce seed of the best quality, and such seed can not be sold at a low price.

PLANTING.

Do not plant near any other vine crop. Do not plant more than two or three seasons in succession in the same soil. Plant as soon as the danger of frost is past, as every grower desires to get cantaloupes as early as possible, and it will pay to take some risk. If there is danger of frost about the time the first planting is coming, plant a second time between the hills. Should

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the first planting be injured the second planting will be coming on. Thus several days time will be gained. If frost does not come it is an easy matter to cut out the later planting, and far better than having to replant.

Until recent years the planting was all done with the hoe in this section, but at this time many of our growers use the hand corn planter of the rotary type, and still others use the seed planter. The latter can only be used when you plant in drills to be worked one way only. The seed should be covered about an inch deep. The greatest care should be used in planting to secure a good stand, and this work should not be trusted to boys or to careless help.

CULTIVATION.

Before the plants are quite up rake the surface of the hills lightly with a rake, or if you have a large patch then you can save time by using the weeder, which is wide enough to rake two rows at the same time. This will retard the growth of grass that might be ready to start and at the same time will help in the development of the tender plant. If the crust is not removed, a poor stand will result. As soon as the plants are up nicely hoe them lightly around the hill, taking care not to disturb the tender roots, drawing fine, moist soil about the plants. Care must be taken not to cover the leaves. Hoe in this manner very often before the plants begin to vine, the oftener the better. Do not hoe or handle the plants when they are wet. Start the cultivator as soon as the plants are up, and before if a crust has been formed. The fourteen-tooth cultivator is the tool generally used by our growers. Give frequent shallow cultivation as long as possible to get between the rows without disturbing the vines or roots. Cultivate at least once a week. You may be able to keep down the weeds and produce a good crop with less labor, but to get the best results it is necessary to keep the hoe and cultivator busy. The cantaloupe should have a continuous, healthy growth. The slightest check or setback in the growth will retard the early development and reduce the yield. When the plants get started and have four leaves and danger from beetles is past, thin to one to two to the hill, to be determined by the distance the hills are apart and by the fertility of the soil. Strive to produce standard size melons.

ENEMIES OF THE CANTALOUPE.

If bothered by cutworms, act as quickly as possible to use means to destroy them. Do not wait till you have lost your first planting of seed, but use paris green and bran mixed wet with a small quantity of cheap black molasses and apply to the hills or drills, and do it on or about the time the seeds are sprouting, and if you fail to kill all of them make the second application while the plants are coming up. For ground fleas dust the plant early in the morning when moist with dew with a mixture of one pound of paris green to twenty pounds of flour or land plaster. As the plants grow keep a constant watch

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for the aphis or melon louse. If you find an infected hill, bury it or cover with straw and burn. The aphis first shows up on a few hills and, if destroyed before they are large enough to fly, they can be controlled so that little damage will be done, but a constant watch is necessary.

PREPARING FOR THE HARVEST.

Now comes the most important period of the entire season. Before the crop is ready to move every preparation should be made for quick and economical handling. When the melons begin to ripen they will not wait. Every moment lost at this stage reduces the profits. Have ample packing houses or sheds at the most convenient place for the handling of the melons. Have a good supply of crates nicely made up and stored out of the sun and dust. Have sufficient help engaged. If possible, have at least one experienced picker and packer. If the harvest is undertaken with all inexperienced pickers in the beginning of the season, there is likely to be a great loss, and at the time when they will bring the highest prices. A careless, indifferent picker will leave more than enough melons in the field to pay the wages of the best experienced help that can be obtained. Therefore if experienced help can be had don't stand back on the additional cost.

The picking of cantaloupes is the most important and critical part of the business. Care and experience are required to pick the melons in the proper condition for shipping to distant markets. Carelessness or ignorance on this point causes disappointment and loss to the grower, merchant, and consumer. On the other hand, the eager demands of a good market, the urgent request of the commission men to rush shipments, and the natural desire on the part of the grower to obtain his share of the fancy prices often paid for the early melons is a temptation to the experienced grower to pick and ship melons before they have reached the marketable stage. .An overstocked market with an inferior product, and the report that the melons from that district are of a poor quality is the result; otherwise good judgment, with a little patience on the part of the grower, would have brought different results. It is impossible to build up a reputation or to obtain satisfactory returns by shipping green or overripe melons.

WHEN TO PICK.

The cantaloupe begins to ripen on the inside when it starts to take on sugar, which, according to the best authorities, is less than forty-eight hours before the melon is thoroughly ripe. When the ripening process begins it requires some experience to tell from the outward appearance when it is ready to pick, the change being so slight that the inexperienced will scarcely detect it. The skin between the netting gradually assumes a peculiar gray cast; the netting becomes more prominent and of silvery whitesh color. On close examination a slight crack about the stem will be found, and with a little pressure

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on the stem with the thumb or forefinger it should part or slip from the melon without breaking the stem or melon, leaving a smooth, natural cup where detached. When picked at this, the proper stage, the melon has its natural sweetness and flavor, and if carefully handled with proper refrigeration and good transportation service will carry to any market in first-class condition. Melons picked while cool and kept cool will hold up far better in shipping than if picked in the heat of the day. After the first few days pick over the fields carefully at least twice a day and you will have but few overripe melons.

SORTING, GRADING, AND PACKING.

Pack the melons from packing bins by color as nearly as possible. Crate the ripe ones by themselves and ship to nearby markets. Do not put up inferior, overripe, or green melons under any circumstances, as they rarely bring transportation charges and are detrimental to the sale of the better grades. When shipping any distance without refrigeration, wrap each melon in a neat, soft wrapper, and they will carry in much better condition.

In packing, the crate should be placed parallel with the bin on a stand, with the end farthest away from the packer elevated about 6 inches. Begin at the lower end of the crate by placing three melons lengthwise with the crate across the lower end with the blossom end toward the end of the crate. Continue packing in rows of three across the crate until there are fifteen melons in bottom layer; then the middle and top layers are packed likewise. This applies to 45 standard crates. When packing is properly done, all sides should be equally attractive and symmetrical.

Different sizes and styles of packages are used in the various growing districts of the country. On this Peninsula the standard 45 is the crate mostly used for standard size melons; and 45 and 36 jumbos are both popular sizes for melons too large to be crated in the standard 45 crates. In some districts the special sizes, holding 12 and 24 melons respectively, are coming into use. Growers located near the large markets often ship in baskets. Melons packed in clean, well-made packages will bring better prices than if put on the market in an unattractive package.

MARKETING.

The marketing of the crop to the best possible advantage requires experience and sound business judgment. There are a number of well-known, responsible firms in the principal markets who make a specialty of handling cantaloupes. Many of these firms have years of experience and we want such men to handle them if we expect satisfactory sales. Don't change commission men every year; try to get a good one and stick to him and have but one in the same market. Don't put your own cantaloupes in competition with yourself. Nearly every grower sells all he can to good advantage at the loading station for cash, but on account of the perishable nature of the product it is

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next to impossible to find responsible dealers who are willing to take the great risk involved.

PAST AND FUTURE.

From a financial standpoint the past season has been one of the most disastrous in the history of the cantaloupe business, both to the grower and the dealer, which may be accounted by from different causes. On account of the general business depression throughout the country, the demand was much lighter than usual. The crop was the largest on record. The season was backward, causing many shipping sections to come into the markets at the same time. In consequence the markets were overloaded with inferior stock throughout the shipping season and neither the producer nor the distributor made any money.

Every large shipping point should greatly reduce the acreage and ship nothing but the very best stock. Every grower should endeavor to produce cantaloupes of a better quality and use the most care grading, handling, and packing, as there are thousands of crates shipped every season that never should leave the packing sheds. As a rule it is not the grower with the large acreage that shows the best results; the grower who plants the small acreage, who uses the greatest care in selecting suitable soil, has it thoroughly prepared, gives the best cultivation, is careful in picking, packing, and marketing, is the fellow who shows a nice bank account at the end of the season. This class of growers fully realize the importance of planting the best grade of seed to be had, regardless of the price, for they know the best is the cheapest and the cost is but a small item compared with the results they will obtain. The first few crates marketed will pay for the seed. We have known of growers buying inferior seeds and losing practically their entire crop as the result of their "penny-wise, pound-foolish" policy.

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BEAUTIFYING THE COUNTRY.

H. D. HEMENWAY.

It has rightly been said that God made the country and made it beautiful, and man in many cases has taken away the beauty that existed. There is no reason why the rural home or community can not be as well kept and as beautiful as the urban home and the city.

There are things that mar the beauty and disturb the health. One of the commonest is the dumping of rubbish, tin cans, and often garbage, with other waste beside or in sight of the public highway. Again, the surroundings of the home sometimes are not merely untidy, but unsanitary as well. Disease germs, flies, and mosquitoes are breeding in places where pretty and useful things might grow. A heavy toll is paid in human life because we fail to observe sanitary laws. After a rain in summer every tin can that has caught water becomes a breeding place for mosquitoes. Only those who have observed this realize the large number of mosquitoes they produced. It is said that the whole cost of the Panama Canal is justified, even if a ship never passed through it, because of the sanitary lessons it has taught the world. A case of yellow fever broke out in the Canal Zone and three bodies of engineers made a search for the breeding place of the mosquito that was spreading the disease, only to find it in a little tin can in the underbrush. This destroyed, the disease was checked. The army engineers and surgeons produced in a supposedly impossible place, the tropics, the most sanitary condition on the globe.

Tin cans and garbage dumped along the roads and in back yards are the cause of many flies, mosquitoes, disease and death germs. We should all be surprised to find a big file of tin cans in the corner of the parlor of the most humble home, yet the yard is the outdoor parlor of a man's home, and as I visit thousands of homes I often find a pile of tin cans and worse things in the outdoor parlor. These cans will breed flies and mosquitoes enough to make a whole neighborhood uncomfortable. We can not grow good things and bad things in the same place any more than we can do good things and bad things at the same time.

How much better to grow good things, pretty things, health and beauty, rather than ugly things, disease and death. The best way to make the country beautiful is to make every home attractive. The home ought to be the prettiest place on earth in which to live, as well as the best. Keep city streets clean and rubbish away from the country roads.

Set trees along the streets and roadways. These should be desirable, permanent trees, well planted and staked and properly spaced. Always avoid

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temporary, nearly worthless trees, sometimes planted by real estate developers.

We should begin by making the home attractive. The first thing to do always and everywhere is to clean up or see that the surroundings are clean. To make the home attractive, consider it as a picture; then make it the most beautiful picture it is capable of being made. The home—the house—should be the center of the picture with a background to show it up and a living frame of plants, flowers, shrubs, and trees to show it up to the best advantage.

There are three simple rules for planting about the home, called the A B C of planting:

A. Keep open centers.

B. Avoid straight lines and sharp angles (except in formal planting).

C. Plant in masses.

It is not necessary to plant expensive things. In the rural community shrubs may be gathered from the pastures. Where there is a will to live in an attractive home the lack of funds may be overcome in this way. Plant trees and tall-growing shrubs toward the rear for background effects. Also, blot out all ugly views. A stable or a neighbor's shed can be obliterated as far as the view is concerned by a close planting.

One of the reasons boys and girls leave the farm is because of the unattractive homes. The home is the first place to begin to make a country beautiful. It is important to interest boys and girls. In many places garden work is becoming part of school training. Children learn at school to know and to grow vegetables, flowers, and shrubs. In such communities the aesthetic, the sanitary and ethical conditions are brought to a higher level. School garden work always helps the sanitation of the neighborhood and the beauty of the home. Any person beautifying his home often influences the entire neighborhood. This is clearly illustrated by the influence of Michael Burke.

Mike is a laborer in a mill in a city of about 20,000 people. He lives down near the factory. A few years ago there were no well-kept homes on this street. Many had grassless yards and some had waste, garbage, and tin cans in the back yards. Mike's place was one of the worst. He was ill part of the time, losing several days every month from his work. He spent his time and money away from home. We offered a prize for the best kept home and Mike became interested. He began to get up at 4 o'clock in the morning and work about the home. He made a man of himself, became well and strong. He has not missed a day from work for ten years, not since he cleaned up. Soon the neighbors began to take notice and clean up their places. The influence spread, until now the whole city has not only well-kept but well-planted out homes, making the home—the house—the central feature of a picture with a living framework of shrubbery about it and the prettiest place on earth, as well as the best in which to live, and work in the air and sunshine has helped to make healthier, nobler, better citizens.

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I shall be glad to have you ask questions, but let me say again that if you set the right plant in the right place at the right time in the right way, it will surely grow.

Following this there were questions about the Spiraeas and the Spiraea Van Houth; Mergelia, Althaea Scarlet, Sage.

Benjamin Rish asked about crepe myrtle and the discussion that followed brought out the fact that while desirable in protected places it is not always hardy in this latitude.

Mr. Killen asked why nurserymen do not catalogue hardy varieties, to which Mr. Hemenway replied that nurserymen propagate what they can sell; that it is costly to propagate and develop native shrubs and advertise them so as to popularize them. It might be a good thing for experiment stations to take up the matter.

Mr. Killen mentioned Kalinea, especially the Curel, as being good and very pretty, as well as the native rhododendrons. Mr. Hemenway replied he did not suggest these because while very desirable in shady places where the soil is suitable, clay soil and an abundance of lime in the soil is death to them. They can be successfully grown, however, in localities where clay soil exists by removing all the soil for a depth of three or four feet and importing gravel and leaf mold. They should also be well mulched in summer.

Evening Illustrated Lecture.

HOW TO MAKE THE HOME AND CITY BEAUTIFUL.

H. D. HEMENWAY.

This illustrated lecture brought out the fact that by some work every day about the home it is possible to make the home attractive with but little cost in money.

By means of the slides he showed the effect of softening the angles with vines and hiding the bare bones of the foundations of the buildings with shrubs and flowering plants.

As the neighbors' unsightly buildings can not always be eliminated, he advised planting Lombardy poplars, which grow tall and rapidly, in front of these; to hide the fences plant California privet hedge and

Make a map of your place, mark where you think each tree, vine, and shrub will be most effective, select your flower beds, on the margin make annotations, so that there will be no confusion, and when planting time comes you will have no delay. Always set out a shrub or two, for they relieve the monotony of the

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landscape during the months when other things are taken up for the winter, besides coming out in leaf sooner and lasting longer.

Observe three rules—(a) keep open centers, (b) avoid straight lines and sharp angles, and (c) plant in masses. Make your house the center of the picture, the foliage the frame.

In this way a small place can be made to look large.

Let it be a home, not a staying place, from which the young folks stray as much as possible.

Showing slides of school gardens, in which the scholars, working with evident pleasure, under the instruction of their teachers, Mr. Hemenway advocated outdoor lessons, saying that weights and measures were impressed upon them in a practical way that the blackboard could not do. Even the teachers were frequently at a loss when confronted with the applied facts.

Many nervous breakdowns were avoided during the school session by this outdoor work; the lessons in spelling, arithmetic, weights and measures, color studies and nature studies were vividly impressed upon the pupils' minds.

Ambition and pride are aroused, each child wishing his lot to thrive and look the best, nor do they ever cheat more than once, as the evidence of their dishonesty, in plain view of the whole world, stares them in the face till the crop is harvested.

The unsightly spots of the city are listed and also a record of the names of the boys who desire to work them.

The boys clean the spots, the league or school board has them ploughed, and, under the supervision of the instructor, the children raise good crops of manliness and womanliness as well as vegetables.

How much better than for them to be roaming the streets and alleys, smoking cigarettes, shooting craps, reading dime novels, and growing a crop of criminals.

The frequent nervous breakdowns of the pupils during the school sessions are prevented by the school garden work and the health of the pupils greatly improved.

Boys and girls all over these United States are being trained to search for insect eggs in winter, thus preventing thousands of dollars in destruction of plant life.

On lots that are now breeding places for the deadly house fly (the typhoid fever fly), to which these United States are yearly paying 4,000,000 lives, and the mosquito also, can be made to produce instead from $20 to $40 worth of vegetables each, which are so badly needed and so hard to get fresh in many cities.

Ten million dollars are spent also on screens yearly.

Ohio boasts of a city where visitors are taken through the alleys to show how perfectly the boys keep them.

Pleading for playgrounds for the children, a beautiful and touching poem was rendered by the speaker, eliciting hearty applause. The slides accompa-

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nying this showed the children out in the hot streets, with nowhere to play except the alleys, thin and pale. The next showed the playgrounds, full of boys and girls, happy, healthy, and safe.

The slides illustrating the work in the poorer parts of the cities followed; a tumble-down fence covered with morning glory vines (cost one cent), rose cuttings, and shrubs obtained from the neighbors; young trees gathered in the woods on Sunday afternoon strolls, combined with the assistance of the teacher, transformed fire traps and disease incubators into dooryards.

The picture showed the bare, desolate homes of the workmen, and the same homes after the organization of the League, the unsightly driveways and stable yards, the bleak front yards, all transformed, under the guidance of the League instructor, for a few cents cost, which is offset many times by the saving in doctor's bills, loss of time from work and drug bills, and frequently made more profitable yet by the winning of one of the prizes offered by the League.

A clean, beautiful city advertises itself, is the home of health and prosperity, both personal and municipal.

It pays to make your city beautiful.

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COMMITTEES.

President Seth appointed the following committees to report at the annual meeting in January, 1916:

	APPLES.	
Walter B. Harris	F. M. Soper	E. G. Cover
	PEACH.	
Prof. C. A. McCue	F. C. Bancroft	Thos. M. Bartlett
	PEARS.	
D. S. Collins	Prof. W. R. Ballard	Herbert Richardson
	NUT CULTURE.	
J. S. Kelley	J. W. Killen	Purnell Emerson
	GRAPES.	
John Buttery	G. Frank Gootee	E. T. Hipwell
	SMALL FRUITS.	
Gerome A. Davis	O. A. Newton	Dr. F. P. Herr
	MARKET GARDENING.	
J. Howard Hirst	Francis E. Matthews George T. Robinson	Prof. J. F. Monroe
	SWEET POTATOES.	
E. F. Legates	W. Irving Walker	J. Frank Biggs
	WHITE POTATOES.	
E. H. Shallcross	J. F. Dukes	James Friedel
	FUNGUS DISEASES.	
Prof. T. F. Manns	Prof. J. B. S. Norton	Prof. E. P. Walls
	INJURIOUS INSECTS.	
Prof A. B. Graham	Orlando Harrison	S. H. Derby
	NEW FRUITS.	
W. F. Allen	Prof W. F. Massey	Wm. E. Sanger
	FERTILIZERS.	
Robert Symonds	Harry P. Skipper	William Reddie

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HORTICULTURAL EDUCATION.

Prof. H. A. Patterson
Prof. T. B. Symonds
Prof. Nicholas Orem

FLORICULTURE.

W. Irving Walker
Mrs. F. C. Bancroft
Courtland W. Roe

TRANSPORTATION.

O. A. Newton
Thomas A. Smith
D. S. Collins
W. Irving Walker
M. B. Nichols

MELONS.

C. W. Bacon
McKenzie Goldsborough
D. C. Corkran
S. E. Douglass

STRAWBERRIES.

Dr. L. C. Freeney
Irving Saulsbury
Dr. John Aikenhead
Wm. Thomas Showell

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VOL. 5 NO. 3

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TRANSACTIONS

OF THE

PENINSULA HORTICULTURAL SOCIETY

1916

Entered at the Post Office in Dover, Delaware, as Second Class Matter under the Act of Congress, June 6, 1910.

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TRANSACTIONS

OF THE

Twenty-ninth Annual Meeting

OF THE

Peninsula Horticultural Society

HELD IN

Easton, Maryland

January 11, 12, 13, 1916

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S. L. BYRN, Cambridge, Md.

Secretary-Treasurer,
WESLEY WEBB, Dover, Del.

Vice-Presidents for the Several Counties

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Sussex—George A. Hill, Bridgeville.

Maryland:

Cecil—Charles B. Warburton, Elkton.
Kent—Walter B. Harris, Worton.
Queen Anne—E. S. Graham, Barclay.
Caroline—J. S. Lapham, Goldsboro.
Talbot—Gen. Joseph B. Seth, Easton.
Dorchester—Fred Hirst, Cambridge.
Wicomico—Fulton W. Allen, Salisbury.
Worcester—Orlando Harrison, Berlin.
Somerset—Frank E. Matthews, Pocomoke.

Virginia:

A. J. McMath, Onley.
Northampton—W. L. Elzey, Exmore.

Executive Committee.

J. Leonard Soper, Magnolia, Del.
E. H. Shallcross, McDonough, Del.
O. A. Newton, Bridgeville, Del.
S. L. Byrn, Cambridge, Md.
W. Irving Walker, Chestertown, Md.

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Peninsula Horticultural Society

TWENTY-NINTH ANNUAL MEETING

The twenty-ninth annual meeting of the Peninsula Horticultural Society was held in Music Hall, Easton, Md., January 11, 12, 13, 1916. Owing to the illness of President Joseph B. Seth, Mr. M. B. Nichols presided at the opening session, and Vice-President J. Leonard Soper at the subsequent sessions.

The meeting was called to order at 2 o'clock and the Rev. J. P. Stump, of Easton, led in prayer.

The address of welcome was made by Col. James C. Mullikin, of Easton, and the response by Walter B. Harris, of Worton, Md.

The following committees were appointed: Auditing, R. R. Pailthorp, W. E. Sanger, and James T. Anthony; Nominations, W. Irving Walker, F. M. Soper, and Dr. A. S. Cover; Resolutions, C. M. Peters, J. W. Killen, and W. B. Harris.

The following officers were elected: President, J. Leonard Soper; First Vice-President, S. L. Byrn; Secretary and Treasurer, Wesley Webb. Vice-Presidents for the counties: New Castle, Dr. H. B. McDowell; Kent, F. M. Soper; Sussex, George A. Hill; Cecil, Charles B. Warburton; Kent (Md.), Walter B. Harris; Queen Anne, E. S. Graham; Caroline, J. S. Lapham; Talbot, Gen. Joseph B. Seth; Dorchester, Fred Hirst; Wicomico, Felton W. Allen; Worcester, Orlando Harrison; Somerset, F. E. Matthews; Accomac, A. J. McMath; Northampton, W. L. Elzey. Executive Committee, J. Leonard Soper, E. H. Shallcross, O. A. Newton, S. L. Byrn, W. Irving Walker.

Prof. C. A. McCue and Mr. F. M. Soper made reports of the meeting of the New Jersey Horticultural Society at Freehold, early in December.

Mr. J. Howard Lippincott, of Moorestown, N. J., was recognized as the delegate from the New Jersey State Horticultural Society and extended the greetings of that society.

An evening session was held on Wednesday at the assembly room of the public school, when a banquet was served by the ladies of the Grange and of Easton. The High School pupils sang some songs, which added much to the enjoyment of the occasion.

Upon motion of Mr. W. Irving Walker, the Secretary was directed to prepare a sketch of the life of John J. Rosa; and also of James S. Harris, for publication in the annual transactions.

The Committee on Resolutions made the following report, which was adopted:

Resolved, That we, the Peninsula Horticultural Society, offer our sincere thanks to the City Council of Easton for the use of Music Hall for our place of meeting.

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Resolved, That we thank the Board of Education for the use of the assembly room, and the ladies of the Grange and of Easton, for the sumptuous banquet served the members of the Society and invited guests.

Resolved, That we extend our thanks to President Joseph B. Seth for his untiring efforts in behalf of the Society during the year; to Mr. M. B. Nichols for his valuable assistance; to Messrs. Shannahan & Wrightson for the use of this room for the display of fruits and vegetables, and to exhibitors who have made this magnificent display possible.

C. M. PETERS.
J. W. KILLEN.
W. B. HARRIS.

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REPORT OF JUDGE ON FRUITS

PROF. ARTHUR J. FARLEY,
New Brunswick, N. J.

For Best General Display of Fruits—First prize, $150, to F. M. Soper & Son, Magnolia, Del.; second, $125, Sanger Bros., Cordova, Md.; third, $100, to W. B. Harris, Worton, Md.

Best Single Box—First, $25, Sanger Bros.; second, $15, F. M. Soper & Son; third, $10, W. B. Harris.

Best Three Boxes—First, $15, F. M. Soper & Son; second, $10, Sanger Bros.; third, $5, W. B. Harris.

Best Five Boxes—First, $25, S. M. Soper & Son; second, $15, Sanger Bros.; third, $10, W. B. Harris.

Best Ten Boxes—First, $50, F. M. Soper & Son; second, $30, Sanger Bros.; third, $15, W. B. Harris.

Best Three-barrel Collection—First, $15, W. B. Harris.

Best Single Box of Varieties—First, $5; second, $3; third, $2.

Jonathan—Third, F. M. Soper & Son.

Lankford—First, W. B. Harris.

Nero—First, F. M. Soper & Son.

Paragon—First, F. M. Soper & Son.

Rome—Second, F. M. Soper & Son.

Stayman—First, F. M. Soper & Son; second, W. B. Harris; third, Sanger Bros.

Stark—First, F. M. Soper & Son.

Winesap—First, F. M. Soper & Son; second, W. B. Harris; third, Sanger Bros.

York Imperial—First, W. B. Harris; second, F. M. Soper & Son.

Best barrel of the following varieties—First, $5; second, $3.

Ben Davis—First, Sanger Bros.; second, W. B. Harris.

Lankford—First, W. B. Harris.

Paragon—First, W. B. Harris.

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Stayman—First, W. B. Harris.

Winesap—First, W. B. Harris; second, Sanger Bros.

York Imperial—First, W. B. Harris; second, Sanger Bros.

Best Parcel Post Package, $5, Sanger Bros.

Best single plate of the following varieties—first, $1.50; second, 75 cents:

Ben Davis—First, W. B. Harris; second, F. M. Soper & Son.

Delicious—Second, F. M. Soper & Son.

English Redstreak—First, F. M. Soper & Son.

Fallawater—First, W. B. Harris.

Gano—First, F. M. Soper & Son.

Grimes—First, Sanger Bros.

Jonathan—Second, F. M. Soper & Son.

Lawver—First, W. B. Harris; second, F. M. Soper & Son.

Lankford—First, W. B. Harris; second, F. M. Soper & Son.

Nero—First, F. M. Soper & Son; second, Sanger Bros.

Nickajack—First, F. M. Soper & Son.

Oldenburg—First, F. M. Soper & Son.

Paradise—First, Sanger Bros.

Paragon—First, W. B. Harris; second, F. M. Soper.

Rome—First, F. M. Soper & Son; second, Sanger Bros.

Smith Cider—First, F. M. Soper & Son.

Stark—First, F. M. Soper & Son; second, W. B. Harris.

Stayman—First, W. B. Harris; second, F. M. Soper & Son.

White Pippin—First, Sanger Bros.

Williams—Second, F. M. Soper & Son.

Winesap—First, W. B. Harris; second, Sanger Bros.

Pears.

Best Plate of Kieffer—First, $1.50, Sanger Bros.; second, 75 cents, Gervis Hall, Easton, Md.

Amateur Class—Apples.

Best Single Box—First, $25, Norman Hutchison, Easton, Md.

Best Box of Winesap—First, $5, Gen. Joseph B. Seth, Easton, Md.

Best Plate of Paragon—First, $1.50, Norman Hutchison.

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REPORT OF JUDGE ON VEGETABLES

W. C. PELTON.

Best Collection of Vegetables—First, $25, J. Howard Hirst, Cambridge, Md.; second, $15, Fred Hirst, Cambridge, Md.; third, $10, George T. Robinson, Easton, Md.

Best Five-eighths Basket of Varieties of Potatoes—First, $2; second, $1.

Green Mountain—Second, J. Howard Hirst.

Irish Cobbler—First, J. Howard Hirst.

McCormick—First, J. Howard Hirst.

Golden Rural—First, Gen. Joseph B. Seth.

Early Hebron—First, Gen. Joseph B. Seth.

Best Slip Seed Sweet Potatoes—$3, W. B. Gordy, Laurel, Del.

Best half-bushel basket of each of the following varieties—First, $2; second, $1:

Big Leaf—Second, W. B. Gordy.

Big Stem—First, J. W. Killen, Felton, Del.

Southern Queen—First, J. W. Killen.

Cabbage—Best three heads of the following varieties—First, $1.50; second, 75 cents:

Drumhead—First, J. Howard Hirst.

Danish Baldhead—Second, J. Howard Hirst.

Flat Dutch—First, J. Howard Hirst.

Houser—First, J. Howard Hirst.

Surehead—Second, J. Howard Hirst.

Carrots—First, $1.50, J. Howard Hirst; second, 75 cents, J. W. Killen.

Celery—First, $1.50, Fred Hirst; second, 75 cents, J. W. Killen.

Kale—First, $1.50, J. Howard Hirst; second, 75 cents, J. W. Killen.

Lettuce, Head—First, $1.50, Fred Hirst; second, 75 cents, J. Howard Hirst.

Lettuce, Leaf—Second, 75 cents, J. Howard Hirst.

Onions—Prizetaker—Second, 75 cents, J. W. Killen.

Strasburg—First, $1.50, George T. Robinson.

Parsnips—First, $1.50, J. Howard Hirst; second, 75 cents, George T. Robinson.

Parsley—First, $1.50, Fred Hirst; second, 75 cents, J. Howard Hirst.

Pumpkins—First, $1.50, Fred Hirst; second, 75 cents, J. Howard Hirst.

Salsify—First, $1.50, J. Howard Hirst.

Spinach—First, $1.50, Fred Hirst; second, 75 cents, George T. Robinson.

Turnips—First, $1.50, J. Howard Hirst; second, 75 cents, J. W. Killen.

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REPORT OF THE TREASURER

WESLEY WEBB.

Receipts.

Balance January 12, 1915	$1,967.87	
Easton Star-Democrat	50.00	
Atlas Powder Company, for space	10.00	
Charles Warner Company, space	20.00	
Practical Farmer	2.00	
American Chemical Company, space	20.00	
Thompson Chemical Company, space	20.00	
Air Tight Tank Company, space	30.00	
DuPont Powder Company, space	20.00	
J. G. Harrison & Sons, space	10.00	
Stark Bros. Nursery Company, space	5.00	
Pennsylvania Farmer, space	2.00	
Delaware appropriation	1,000.00	
		$3,156.87

Expenditures.

Miss Jennie G. Hammitt	$5.00
John Armstrong	19.25
E. H. Shallcross	12.25
Arthur J. Farley	37.75
W. H. Alderman	41.85
E. H. Shallcross	37.63
S. G. Simmons & Bro. Co	18.75
H. E. Reed	9.00
James F. Price	2.00
M. A. Blake	31.42
H. D. Hemenway	42.97
Albert Bucher	3.00
Marshall Jones	1.87
E. H. Shallcross, premiums	148.50
Soper & Son, premiums	258.75
Sanger Bros., premiums	255.00
W. B. Harris, premiums	177.00
A. W. Armstrong, premiums	68.00
W. H. Conard, premiums	6.00
F. J. Dukes & Bro., premiums	14.00

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Naudain & Son, premiums	$2.00	
J. Howard Hirst, premiums	44.75	
George W. Burris, premiums	13.00	
Harvey Ball, premiums	25.00	
J. T. Shallcross, premiums	15.00	
F. C. Snyder, premiums	4.00	
Mrs. F. C. Snyder, premiums	35.00	
Ethel Snyder, premiums	10.00	
J. W. Killen, premiums	8.75	
W. B. Gordy, premiums	3.00	
J. S. Kelley, premiums	11.50	
S. H. Warren, premiums	3.50	
W. Irving Walker	20.00	
C. G. Ritter, stenographer	20.40	
J. F. Starling, postmaster	10.35	
W. H. Savin	1.07	
Matos-Menz Advertising Company	15.60	
Freight	9.91	
Easton Star-Democrat, printing proceedings	347.56	
Postage on reports	22.90	
Balance January 12, 1916	1,343.59	
		$3,156.87

REPORT OF THE AUDITING COMMITTEE

Your committee, appointed to audit the accounts of the Secretary and Treasurer of the Peninsula Horticultural Society, report they have examined the same and have found them correct, viz:

Balance on hand last audit	$1,967.87
Received during the year	1,189.00
Total, including balance	$3,156.87
Disbursements	1,813.28
Balance in hand January 12, 1916	$1,343.59

R. R. PAILTHORP.
WILLIAM E. SANGER.
JAMES T. ANTHONY.

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ADDRESS OF WELCOME

COL. JAMES C. MULLIKIN,
Easton, Md.

I was asked to take the place of Mr. Warburton, but you all know that is impossible. I can't take his place and am very sorry that he is sick, and by the time I am through you will all be sorry too. In his name and in the name of this Society and the people of Easton I want to extend a cordial welcome. To say we are glad to have you among us would be weakly expressing it. You have done a great work and you have a great field. Sometime ago a friend came to see me whom I had not seen for thirty years. He had spent two years in Ohio, two years in Illinois, two years in Kansas, and he said they were all fine States. He was also in Idaho, California, the Philippines, China, and Australia, and all the places were fine, and so the thirty years had been spent. I asked him what place did he think was the best country of all the places he had been. He replied they are all fine, but when you come to balance the advantages and the disadvantages there is no place on earth like the country between the Delaware Bay and the Chesapeake Bay. He was telling the truth. I have not seen any place that would compare with this Peninsula. We have no cyclones nor blizzards. We have none of the disadvantages but have all the advantages you can think of. We have the best oysters in the world, the finest fish you can find anywhere, to say nothing of terrapin and crabs, and in addition, we can raise the finest peaches and apples that are raised anywhere. Why, you can't get fruit anywhere to equal that on exhibition here today, not in flavor, and scarcely in color, and they don't raise any better men nor prettier women than we do here on this Peninsula. I think we can beat the world at nearly everything that makes a country worth living in.

While we have all these things, I am glad we have a society like this to help make the best of these advantages. These annual meetings will give an impetus that nothing else could equal. You can see all around a great difference in the matter of fruit raising, particularly in the last few years since this Society has been in existence.

When I was a boy we used to raise apples most of you would not even feed to your hogs. Our Grindstones had no taste and the Carthouse was not like the Carthouse of today. They were little, knotty, colorless apples, and we had nothing equal to the apples you have on exhibition here today. And we are improving constantly. Even five years ago we had not the apples you have here. Your Society is helping the interest in fruit growing on, is putting strength and life into the growing of these fruits, and we will keep on increasing and increasing.

We are glad to have you among us. I wish we had better weather so you could see our town, for we have the nicest town anywhere about. We are progressive and wide-awake. We hope your stay with us will be so pleasant that you will come back to have your meeting here again. It is a great pleasure to our town to have you among us.

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PRESIDENT'S ANNUAL ADDRESS

GEN. JOSEPH B. SETH.

Ladies and Gentlemen, Fellow-Members of the Peninsula Horticultural Society:

This is the first opportunity I have had to thank you for your kind consideration in selecting me to preside over your Society for the past year, and I now desire to return my sincere thanks for your favor.

I regard the Peninsula Horticultural Society as the most important organization connected with the interests of the Maryland-Delaware Peninsula. This Society was formed at Dover, Delaware, on October 21, 1886, and Mr. John W. Kerr, of Denton, was elected its first president; in fact, Mr. Kerr was the leading spirit in its organization. Since that time the Society has gradually and steadily grown in importance, and its usefulness has been much extended.

I think there is a great future for the Peninsula in the line contemplated by this Society. Personally I feel proud of the fact that I was born on this Peninsula, and also proud of the fact that I was born in Talbot County. I suppose there are other members who are equally proud that they were born in other counties, and this is just as it should be.

This Peninsula is really a garden spot for the horticulturist. The soil, the climate, the situation with reference to markets for their produce, and the means of transportation are all ideal. These great centers of population in the New England and Middle States require vegetables and fruit at all seasons. It is said that "man can not live by bread alone," and when we speak of a short diet we say he had to live on bread and water. Further, the average person does not desire more than one kind of meat, but at each and every meal there is, on well-ordered tables, a variety of vegetables. The Delaware Bay and the Atlantic Ocean, with the Gulf stream lying on the east of the Peninsula and the Chesapeake Bay on the west, with temperatures that vary little from summer to winter, modify the temperature in this Peninsula so as to make the extremes of both heat and cold very short in their duration, and the seasons here in the spring are always two weeks in advance of the season north of us as close as New Jersey, and the transportation facilities, which can always take our produce at the setting of the sun and place it in Philadelphia and New York before the rising of the next sun, insure a satisfactory market for all our produce.

The horticultural interests have undergone a great change in the last few years. Formerly our forefathers planted their crops and found nothing necessary for their cultivation except to keep down the weeds; now, however, the hoe has to be supplemented with the spray. Innumerable insects and fungus

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diseases have appeared and are coming in each year, which require no ordinary labor, but, in addition thereto, scientific treatment. Intelligence now is a necessary element in successful cultivation, and it behooves us to take such action as will insure a diffusion of knowledge among the people that will enable them to combat the conditions as they arise.

During Maryland Week in Baltimore in November a gentleman who has been cultivating fruits in the State of Oregon for several years past, in an interview by a newspaper man, stated that he had quit the West to come East to grow apples; that while the apples in the West had more color, they did not have the same degree of flavor as Eastern apples; that in the beginning the West had gotten control of the Eastern markets by careful handling and marketing of their fruit so as to make it attractive, but that the East had now caught on and were competing in a manner to shut them out from these markets, as the superior quality of the Eastern apples, assisted by lower freights, would surely capture these markets if the fruit was properly handled. A recent incident will probably be appreciated by our people. Just before Christmas I sent to Mr. Charles A. Green, the editor of Green's Fruit Grower (an old gentleman who has served a lifetime in the nursery business at Rochester, N. Y., and who is a recognized authority on apples), a small package of Stayman Winesap apples grown near Easton, as a present for his Christmas dinner. I received a letter thanking me for the present, in which he said: "Thanks for the beautiful apples, but they are not Stayman Winesap such as I have heretofore received from Oregon. * * * As I have seen the Stayman Winesap from Oregon it is not nearly as red as the sample you sent. * * * I will send the sample to the experts at Washington and will report later in Green's Fruit Grower."

Two days ago I received another letter, in which he says: "With further reference to the apples you sent us as Stayman Winesap, and which we forwarded to the authorities at Washington, D. C., we have just received a reply that they consider these apples typical Stayman Winesap, but they are not what I have bought for Stayman Winesap." He further says: "The apples were large, attractive, and fine flavor." The old gentleman is evidently reluctant to yield his opinion.

In the apples of New York, where some fourteen hundred varieties are illustrated, the illustration of the Stayman Winesap shows a very poor apple in color and appearance, but the author says that the climate of New York is not suited to this particular apple. In fact, anyone desiring to grow apples should consider the soil and climate in his particular locality and get information as to what apples are suited for it.

In 1856 my father planted an orchard of two hundred trees, which he procured from Prince's Nurseries at Rochester, N. Y., and left the selection of the varieties to Mr. Prince, with the result that Mr. Prince sent fruit suited to the climate of New England and New York—the Baldwin, Northern Spy, Spitzenburg, Rhode Island Greening, Roxbury Russett, and some others, all of which were apples that matured in a short season. They were all right in New England, where the trees bloom in May and the fruit does not ripen until the

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cold weather has come on in early October, but with us, where the apples bloom in April, they are ripe in September, and, as our cold weather does not come until November, they are gone before Christmas; in fact, they become late summer apples with us. This orchard I knew for forty years and it was never satisfactory.

With us the old Winesap and her daughters, the Paragon and Stayman Winesap, the York Imperial, the Nero, Ben Davis, and some others which require a long season to mature, will hold on until cool weather comes for packing, while our apples put in New England will never properly ripen because of the shortness of the season.

I want to thank you again for the favor you have shown me and at the same time to welcome you to our city and express the hope that your stay may be an enjoyable one.

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REPORT OF COMMITTEE ON APPLES

WALTER B. HARRIS,
Worton, Md.

The Government crop report for November 1, 1915, estimated the apple crop at 76,600,000 barrels, 8,000,000 barrels less than last year and 18,000,000 above the five-year average. The production in the North Central States was double their ten-year average. The crops of 1906, 1912, and 1914 are the only crops in recent years larger than the 1915 crop. The quality of the fruit for 1915, 84 per cent, is high in comparison with 83 per cent last year and an average of 76 per cent for the past six years. The Office of Markets and Rural Organization reports 4,200,000 barrels and 3,300,000 boxes in cold storage December 1, 1915, in comparison with 3,200,000 barrels and 4,100,000 boxes held by the same plants December 1, 1914, which shows an increase of 33 per cent in barrel holdings and a decrease of 25 per cent in box holdings. Does this mean that box packing has been overdone and is proving less profitable than barrel packing? It would be of interest to know how the remaining 71,000,000 barrels not accounted for by cold storage holdings have been disposed of.

With the many apple orchards that have been planted and now coming into bearing, and the fact that next year is the apple year, points to a bigger crop for 1916 than the present source of consumption can dispose of. It will be a test for the "survival of the fittest." Are we, the members of this Society, to be among those weeded out of the apple industry? We will not be among the fittest if we grow inferior fruit. We must prepare for the disposition of the coming crop. We can begin at once by putting our orchard equipment in perfect working condition and providing necessary supplies for the maintenance of the same, and the carrying out of orchard operations at the proper time. Every day this winter we should be at pruning and brush hauling, which will relieve the spring congestion and insure more careful work. Thorough cultivation and spraying will help solve the problem of disposing of our crop. We will have to rely an green manure to help solve the fertilizer problem. Having grown perfect fruit and packed it to meet the demands of the trade we are catering to, we will rank with the survivals.

Early summer apples sold very well, but the prices dropped by the middle of July and continued low. Winter apples have not sold as we expected earlier in the season. One of the Peninsula growers reports getting $2.50 per hamper for Williams Early, sold in Boston the last of July, and $6 per barrel for the same apples. Unfortunately we are not all such good salesmen. Apple plantings have greatly decreased this year.

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Since our last meeting Delaware has passed a law for the standard packing and grading of apples. It would be of interest to know just how the law meets the needs of the apple growers.

Discussion.

Mr. J. L. Soper—The last Legislature of Delaware enacted a law relative to the packing of winter apples. We hoped at the time that it would affect both early and late apples in order that we might offer to the trade no inferior packages. There was great objection on the part of those growers in the State who raised early apples, and they thought it would work a hardship to them and favor the larger growers. They were unable to bring enough influence to bear on the Legislature to defeat the intention of those who were trying to have a law passed, but it affects only the late apples. The law is practically the same as the New York law, with which you are all familiar. The requirements of some of the grades possibly are a little more drastic than the New York law. As to the workings of the law I am not in a position to say. As yet there has been very little brought from storage plants and sold on the Peninsula. Quite a few have endeavored to pack according to the law, but I believe a fairer, better pack will be offered to the trade by those who did try to follow the law this season than ever before.

Mr. W. Irving Walker—I would like to ask Mr. Harris whether he is familiar with the Delaware law and if it would be wisdom to try to have a similar law for Maryland?

Mr. Harris—I am not able to answer that question offhand.

Mr. Nichols—I have heard much about the Williams early apples that Mr. Soper raises. How profitable were they this year?

Mr. Soper—They have never been a failure since they started in bearing. They always do well, but not quite so well in some years as others. This year the price was very good.

Mr. Nichols—I heard you got something like $800 on one-half acre of this variety.

Mr. Soper—We got $899.40 for one car of Williams clear of all expenses. No law will affect any man's honesty. If you go into the apple business you ought to put your Sunday religion into the pack. Put up honest packages and you will always be able to sell them. We ought to have a law passed for our early apples, then we could offer them all in the standard pack and assure people that we were on top wave of the business. From the beginning to the end of the season this year we got good prices—that is, good for early apples. The man that prunes and sprays his trees can grow good fruit, and if he packs honestly he will get a good price.

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RULES AND METHODS FOR JUDGING APPLES

PROF. ARTHUR J. FARLEY,
New Brunswick, N. J.

The rules governing the judging of apples are in many respects so loose and indefinite that many misunderstandings arise between exhibitors, judges, and the officials of societies or associations conducting fruit shows. In view of this condition, every man who is called upon to judge or determine the relative merits of various exhibits should take advantage of every opportunity to meet the exhibitors and other members of a society and discuss with them the rules by which he is governed and the details of the method he follows in making his awards. Such discussion should make it easier to establish definite standards and formulate uniform rules that would guide the grower in the selection of his fruit and govern the judge in rendering his decisions.

There are several methods used by different judges in determining the relative merit of a number of plates, boxes, or barrels of apples competing for certain prizes. One method is to simply compare the various lots of fruit and arrive at a decision through a process of elimination, or simply deciding in an arbitrary manner that one lot is better than another. Such a method may work out all right if there is but little competition, or if the number of entries is small, but if the competition is at all keen, thereby making close decisions necessary, such a system is very unsatisfactory both to the judge and the exhibitor. Unless the judge follows some definite system or standard he is not apt to be consistent, a condition that is often the cause of many misunderstandings. This frequent lack of consistency has led to the score-card method of judging fruit, in which a definite value is placed on various characters, such as form, size, color, uniformity, and condition. It is generally accepted that the relative merit of these characters should be determined by their commercial value. This has had a tendency to place the judge and the exhibitor on the same basis, but, unfortunately, the lack of uniformity among score cards used by judges and adopted by societies in different parts of the country has led to much confusion. Professor Alderman, of West Virginia, found that out of twenty-four institutions, at which a definite score card for plate exhibits had been outlined and adopted, only seven were alike. In other words, he received seventeen different kinds of score cards from twenty-four sources. Several attempts have been made to outline a standard score card for the use of judges and exhibitors throughout the United States and Canada, but, although such cards have actually been outlined and adopted by the American Pomological Society and by the Society for Horticultural Science, the great difference of opinion among judges as to the relative value of the various charac-

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ters makes the general adoption of such a score card very difficult. It is quite true that many practical judges never use a score card in making their decisions on plate exhibits unless the competition is very close, but they do bear in mind the relative value of the various points considered in order that they may be consistent in making their awards. I believe that the best method of all to follow in the judging of apples where close competition exists is to first make a decision by means of comparison and then check up this placing by actually scoring the plates that appear worthy of premiums. In this way the judge has an accurate check on his first decision.

In view of the general lack of uniformity of rules and methods throughout the country it would appear very important that any organization conducting a fruit show should publish, in its premium list, not only score cards for plate, box, and barrel exhibits, but also very clear and definite rules for the guidance of both judge and exhibitor. I would not presume to submit such cards to you, but would like to take a little of your time this evening to discuss some of the score cards in general use. First let us examine the single-plate score card for apples of a given variety adopted by the Society for Horticultural Science.

Form	15
Size	15
Color	20
Uniformity	20
Freedom from blemish	30
	100

Form refers to the normal shape or form of the variety. Every exhibitor should be familiar with the proper form of each variety and see that each apple on the plate is true to type.

Size.—The most acceptable commercial size for the variety should be the ideal. This should be slightly above the average size for the variety in regions where it is well grown. Extremely large fruit is not desirable, as it is often obtained at the expense of color, condition, and uniformity. The question now arises, What is the most acceptable commercial size for each variety? This is a very difficult, if not impossible, question to answer when the entire country is considered, but should be quite easily established within the limits of a State or district where market and cultural conditions are comparable. Several societies have solved this question by publishing in their premium list the range in size that is considered ideal for each variety. Anything above or below the published standard for each variety is not disqualified, but, on the other hand, will not receive a perfect score. The size measurements are usually given in terms of the greatest transverse diameter. The establishment of such a standard is not only a great aid to the grower in selecting his fruit, but also relieves the judge from the responsibility of determining the most acceptable commercial size for each variety.

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Color.—In red, blushed, or striped apples high, clear color is desirable; with those varieties which are typically green or yellow the presence or absence of a blush is not usually considered in judging. Leaf marks are not considered as defects in color. A yellow apple may still be green if it naturally would be so at the time the judging is done. It is always best to select the highest colored specimens. The development of the best color is nearly, if not quite, coincident with the development of the highest quality.

Uniformity.—This applies to form, size, and color. Each one of the apples on a plate should be of the same size, of the same shape or form, and of same degree or shade of color. Each apple should also be of the same ripeness. Uniformity is a severe test of the exhibitor's skill in selection and grading and should receive very careful consideration.

Freedom From Blemish or Condition.—This includes mechanical injuries, such as bruises, spray burn, stem punctures, or loss of stem; insect injury of all kinds and diseases caused by fungi or other parasites. In other words, anything less than absolute physical perfection will not receive a perfect score on condition. Here is another point in which certain definite standards should be established. Shall the presence of a scale or a worm hole disqualify or merely lower the score on a plate of apples? Shall the absence of a stem be considered a more serious blemish than an insect sting that is completely healed over? These and other points too numerous to mention must be decided by the judge, usually without any assistance from the society under whose direction he is working.

PLATE EXHIBITS IN WHICH SEVERAL VARIETIES ARE COMPETING AGAINST EACH OTHER.

Value of variety or quality	10
form	10
size	10
color	20
uniformity	20
Freedom from blemish or condition	30
	100

Value of Variety or Quality.—Quality includes texture, juiciness, flavor, aroma, and any other characters that may be agreeable to the taste. The quality rating of each variety is sometimes determined by referring to the official quality ratings of the American Pomological Society. For some reason this list has not been kept up to date and, therefore, has been discarded or revised by many of the leading horticultural societies. Here is another point on which each organization conducting a fruit show should establish a definite standard for the guidance of both judge and exhibitor. Many societies now divide the varieties for which premiums are offered into several groups, giving to the first group a quality rating of 10, to the second a quality

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rating of 9, to the third a quality rating of 8, and so on. These groups are then published in the premium list and serve as a guide to judges and exhibitors. Personally, I prefer the term value of variety to the more common term quality. It seems to me that the members of every organization should be able to determine what varieties are of the greatest commercial value in their particular State or district. These could then be grouped into one class and given a rating of 10 on value of variety. A second group could be made and given at rating of 9, and so on. By this method the rating would not be made on quality alone, but on the actual commercial value of the variety.

SCORE CARD THAT MAY BE USED IN JUDGING BOX DISPLAYS OF A GIVEN VARIETY.

Fruit:		
Form	100	
Color	150	
Size	100	
Uniformity	200	
Condition	200	
		750
Package:		
Material	30	
Marking	10	
Solidity	10	
		50
Packing:		
Bulge	40	
Alignment	40	
Height at ends	40	
Compactness	40	
Attractiveness and style	40	
		200
Total		1,000

SCORE CARD FOR USE IN JUDGING BOX EXHIBITS IN WHICH SEVERAL VARIETIES ARE COMPETING AGAINST EACH OTHER.

Fruit:		
Quality	100	
Color	150	
Size and form	100	
Uniformity	200	
Condition	200	
		750

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Package:		
Material	30	
Marking	10	
Solidity	10	
		50
Packing:		
Bulge	40	
Alignment	40	
Height at ends	40	
Compactness	40	
Attractiveness and style	40	
		200
Total		1,000

The various characters included in the score cards for boxes are judged according to the same standards as outlined for plate exhibits with the exception that a little more leeway is given for slight box bruises as well as for slight variations in form and size. The color and size should be the same throughout the box. A judge finding apples of less color or smaller size in the lower layers than on the top may make a certain cut on color and size and then double it as a penalty for attempted deceit. A judge should be required to go to the bottom of the box at one end at least, removing and scoring a few apples from each layer. Every single box entry should be examined unless clearly disqualified by fruit or packing, in five-box exhibits at least two boxes should be examined, in ten-box exhibits, three boxes, and in twenty-five-box exhibits, five boxes.

In judging size it is customary for the best judges to give a perfect score to all packs ranging from 88 to 125 apples to the box. Boxes containing 104 3-inch apples or 96 3½-inch apples are considered the ideal size for a show pack in the apple shows of the Northwest.

The box in which the apples are packed should receive careful attention. The standard box, dimensions 10½ inches by 11½ inches by 18 inches is usually given the preference over the special (10 inches by 11 inches by 20 inches). The boxes should be new and clean, free from knots or knot holes. The end should be of one solid piece not less than three-quarters of an inch thick. The side pieces should be nailed with four nails in the end of each piece. Both the top and bottom should be cleated and four nails used in each cleat. The side pieces should be three-eighths of an inch thick and the top one-quarter of an inch. A neat, attractive label or stamp on the end of each box adds to its general appearance and may affect the score.

Packing.—The manner in which the apples are packed into the boxes is very important and materially affects the total score.

The bulge or swell in box packing is very important both commercially and for show purposes. The bulge should be from 1 inch to 1½ inches above

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the top of the box before being put into the press and the cover nailed on. After the cover is nailed the bulge should be between one-half and three-fourths of an inch both top and bottom. Care should be taken that the bulge is even, so that every apple touches the lid. The bulge should start at nothing at each end of the box and rise evenly toward the center with a gentle and regular curve. It is also important that this bulge be secured without placing smaller apples toward the ends of the box than are placed in the center.

Alignment.—This refers to the rows of apples both up and down the box and on each diagonal. The rows should be perfectly straight and uniform, a matter that will take care of itself if proper precautions are taken by the packer in selecting and grading the fruit.

Height at Ends.—The apples at each end of the box should be just flush with, or a trifle above, the end piece. If the apples toward the ends of the box are too high, severe bruising will be unavoidable.

Compactness.—This refers to firmness, determined by the judge by trying to move or turn around the apples in any row. The extreme ideal of compactness is that apples shall be so securely packer that the open box may be placed on end without having the fruit fall out of place. It is not always possible to obtain this extreme, particularly with the smaller sizes.

Attractiveness and Style of Pack.—The so-called 2–2 and 3–2 packs are the only styles desirable for show purposes, with the former always to be preferred to the latter. The square and cheek-to-cheek packs should never be used, as such packs are not commercially desirable. The style of pack varies with the size and shape of the apples, but should always be attractive and regular. There must be no difference in the style of pack from top to bottom. Each layer should be alike both in the number of specimens and the manner in which they are placed in the box. Attractiveness also refers to the manner in which the apples are wrapped. The apple should be neatly and smoothly wrapped in paper of good quality, the so-called "duplex" paper being preferred over thin tissue paper. The details of lining and labeling are also considered under this heading.

BARREL DISPLAYS.

SCORE CARD FOR USE IN JUDGING EXHIBITS OF A GIVEN VARIETY.

Fruit:

Form	100	
Color	100	
Size	150	
Uniformity	100	
Condition	200	
		650

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Package:		
Staves	10	
Hoops	10	
Heads	10	
Nailing	20	
Marking	20	
		70
Packing:		
Facing	80	
Tailing	50	
Pressing	70	
Racking	80	
		280
Total		1,000

SCORE CARD FOR USE IN JUDGING SWEEPSTAKE PRIZES OR OTHER COMPETITIONS BETWEEN DIFFERENT VARIETIES OF PACKED FRUIT.

Fruit:		
Value of variety	100	
Size and form	150	
Color	100	
Uniformity	100	
Freedom from blemish	200	
		650
Package:		
Staves	10	
Hoops	10	
Heads	10	
Nailing	20	
Marking	20	
		70
Packing:		
Facing	80	
Tailing	50	
Pressing	70	
Racking	80	
		280
Total		1,000

In the barrel pack quality or value of variety, size, form, color, uniformity, and freedom from blemish should be judged on practically the same standards as have been outlined for the box. The color standard for barrel apples might be slightly lower than the box standard, but still somewhat above the com-

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mercial standard for such a package. Large size might well be given more consideration in judging the barrel than is given to the same character in judging the box. Some judges do not judge uniformity in the barrel pack on the same high standard demanded in the box pack. However, it is not safe to depend on such leniency, but be prepared for the keenness of competition by selecting fruit that is uniform in size, form, and color for the barrel pack as well as the box pack.

Freedom from Blemish or Condition.—The condition or freedom from blemish should really be as high in a show barrel as would be expected in the box pack. Judges, however, are usually less severe in cutting slight imperfections in barrel fruit than when similar blemishes are found in a box or on a plate. Slight bruises, lack of stem, small skin punctures, limb rubs, etc., are cut at the discretion of the judge. Blemishes caused by insect and fungi are just as serious in the barrel as in the box and should always be avoided by discarding such fruit.

PACKAGE.

Staves.—Barrel staves should be sound, free from knots, and not over 4 inches wide at the bulge. It is also important that the staves be of uniform thickness in order that there may be no sharp shoulders to cut into the fruit when the apples are pressed into the barrel.

Hoops.—Hoops should be three-sixteenths of an inch thick on thin side and five-sixteenths of an inch on the other by 1⅝ inches in width. Cut elm hoops having a straight grain are more desirable than split birch or alder. Wire hoops make a very poor barrel and, therefore, are not at all desirable for the show barrel.

Heads.—The heads should be clean and bright and free from knots and knot holes. Hard wood, such as oak, is very desirable and should not be less than five-sixteenths of an inch nor more than five-eighths of an inch thick.

Nailing.—The bulge or quarter hoops, heads, and liners should be properly nailed. For the heads and liners nails 1¼ inches in length are sufficient, while a somewhat shorter and stouter nail will do for the quarter hoops. There should be three nails in each quarter hoop, equally placed around the barrel and carefully clinched on the inside with the point toward the face. The top and bottom hoops should be nailed through the staves into the head, using two nails to each section of the head, or a total of six. Do not use too many head nails. If the top hoops are properly placed and of the proper size, it is practically impossible, even without nails for the head, to leave the croze without breaking. The nails should be placed at the weakest points, which are near the ends of each section. The head liners should be placed so that they cross each section of the head. Four nails are sufficient for each liner and should be driven at such an angle that the point will just pass through the stave to the second hoop. Under no circumstances should the liner nails be allowed to come through to the outside of the hoop. It should be made a criminal

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offense to have the point of a wire nail projecting upon the outside of the rim of an apple barrel. It is not only unnecessary, but undesirable, to nail the second hoop.

Marking.—All barrels should be neatly but clearly marked, preferably with a stencil. This marking should include the name and address of the packer and the grade and variety of the fruit contained in the barrel. It is, of course, very important that the variety and grade indicated on the head of the barrel should correspond with the fruit inside.

PACKING.

Facing.—This is one of the most important points in the barrel pack and should receive careful attention. The apples on the face should be uniform in size, color, and shape. The apples used for the face should also fairly represent the quality of fruit to be found throughout the barrel. Furthermore, they should be placed in the most attractive manner. The most common method is to place the apples stem down in concentric circles, the number of circles depending upon the size of the fruit. Apples having a transverse diameter of 3½ inches should be so placed that two circles with one apple in the center make up the face. With fruit of this size the outside circle should contain twelve apples and the inner circle six. With fruit ranging from 2⅞ to 3 inches in transverse diameter, three circles will be necessary, the outer circle having fifteen or sixteen apples, the second nine, with three apples in the center. In this face it is very essential that nine apples, no more or no less, be placed in the second circle. Three circles will also be necessary for 2¾-inch apples, the arrangement being as follows: Sixteen apples in the outer circle, 9 in the second, and four in the third. Two-and-one-half inch fruit will require three circles of eighteen, twelve, and six apples, with one apple in the center. The above arrangements for the face layer are standard and should always be used for packing the show barrel. After the face layer is in position a second layer should be made by placing an apple with the colored side down over each space between the facers. This method adds to the attractiveness of the face and also gives the barrel the appearance of being very solid and compact.

Tailing.—A show barrel pack should be tailed off with the same grade of fruit as appears on the face. The apples are placed in circles either with the calyx or stem down, preferably the former. The operation of tailing is the most severe test of a good packer and requires considerable skill and practice. The test of good tailing is to have the apples in the last two layers placed solidly and evenly, so that when completed the head will exert the same pressure on each apple. If two or three apples project above the general surface, serious bruising is unavoidable.

Pressing.—Press the barrel enough to make it solid without danger of becoming slack, but not enough to bruise the apples too severely.

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Racking.—This refers to the shaking of the barrel during the operation of packing. Racking should be done with a quick, sharp jar rather than with a slow, swinging motion. The operation should start after the second basket of fruit has been placed in the barrel and then repeated after each basketful. This operation has a very important bearing on compactness and should not be neglected.

From my knowledge of the conditions existing in this Society, based upon the lessons learned in judging your fruit for the past two years, I respectfully make the following suggestions:

(1) That the proper officers or committee outline two distinct score cards for plate, box, and barrel exhibits, one to be used in judging exhibits of a given variety, the other to be used for awarding sweepstake prizes or for the judging of those classes in which two or more varieties compete against each other.

(2) That the above score cards, if outlined and adopted, be published in the regular premium list of the Society for the mutual benefit of the exhibitors and the judge.

(3) That the varieties of fruit for which premiums are offered be divided into a number of definite groups upon the basis of quality or value of variety, preferably the latter, and that such a grouping be published in the regular premium list.

(4) That the list of varieties for which premiums are offered be accompanied by a table showing the most desirable size or range of size for each variety, this to be expressed in terms of the greatest transverse diameter.

(5) That it be required of all exhibitors of fruit in boxes to wrap all apples in standard apple wrappers, with the exception of the top layer, which should be unwrapped.

(6) That all barrels of apples shall be displayed "headed up" as for shipment, until opened by the judge.

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NEW TREE FRUITS

WILLIAM E. SANGER,
Cordova, Md.

Less than fifty years ago this Peninsula was regarded generally as no place for successful apple culture. Today it is so clearly demonstrated that apples of superior quality can be grown here successfully and profitably that it is now just as generally acknowledged to be a most favored section for apple culture. I think the main reason for this change in our ideas is found in the fact that we have discovered what varieties are adapted to the climate of this section and are giving our attention to the best methods of handling those particular varieties. Many of the varieties which are leaders in the more northern or elevated sections are failures here, and in this weeding out of varieties we find a few best and most successful and profitable here.

In a recent letter from one of the leading growers of the Peninsula he said: "I have tested many new varieties and the longer we grow apples the shorter is our list of desirables." I believe this statement would be corroborated by all the leading commercial growers. The above statements being true, it will be seen that the new varieties which prove worthy of admission into this list will naturally be few and far between. Therefore I doubt whether any of the newer varieties of late apples before us at this time will supplant any of our standard varieties or supplement the list of the old tested and tried sorts. I have no experience personally with fruiting the newer varieties, and what I shall say is from reports from other growers of the Peninsula. The Delicious is a promising variety here, the tree being a good grower and the fruit always delicious, and may prove worthy of planting in a small way for a special or nearby market. However, the fruit is tender, and in storage is inclined soon to get dry and mealy and sometimes insipid. The King David does well here, but there is no doubt that Winesap and Jonathan are of greater value. The Williams Early Red, not a new variety, has without doubt proven itself the very best of summer varieties, being the greatest money-maker of them all. I believe its value should be emphasized, and that it can be planted with all confidence. A variety which might be mentioned as worthy of trial is called Crimson Beauty. It is a bright red apple, ripening about with Early Ripe.

Among peaches the J. H. Hale is most promising. The tree is a vigorous grower and hardy. They have fruited but one or two seasons here, but the description by Hale and Stark seem true even to this section. The fruit is a good keeper and brighter in color than Elberta, owing to the very small amount of fuzz on them. From a report I have from one little tree of Early Elberta at Easton I think this variety is perhaps worthy of trial here. Another variety which appears to be of value, and to be encouraged for Peninsula planting, is the Slappey. It is about a week earlier than Elberta, is described as not quite so heavy a bearer, of better quality, is attractive, and well.

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ADVANTAGES OF THE EASTERN FRUIT GROWER OVER HIS WESTERN COMPETITOR

FRANK W. HARVEY.

Long before the West was thought of as a possible apple-producing region the East had been raising great quantities of apples of fair quality. Even many years before the advent of the pernicious San Jose scale apple trees were to be found on most every farm in the Middle Atlantic and New England States, supplying the family with luscious fruits in abundance and often contributing largely toward defraying the current expenses on the farm, notwithstanding the fact that spraying for perfect fruit had not been thought of.

That the climate here in the East is especially inviting to the profitable raising of fruit and that it is naturally adapted to what we call the king of fruits, the apple, is obvious, when apple trees in their wild nature may be found thriving under adverse conditions; and more especially is this true in all of the States that border on the Atlantic coast, within that which is known as the apple-producing section. Though the apple will grow beautifully in most all parts of the East, there are certain sections which enjoy special advantages over others. The most important of these sections are those that are in close proximity to large bodies of water. Lakes and bays tend to keep the climate more uniform, decreasing the possible danger of a lurking frost during the delicate period of the formation of the fruit. The most favorable of these sections include Long Island, southern New Jersey, and the Delaware and Chesapeake Peninsula.

Perhaps the Peninsula has advantages over the other sections just mentioned, chiefly for two reasons:

First. The soil generally is retentive of moisture, which enters very largely into the profitable production of apples and other fruits. Nearly all of the fertilizing elements are retained in the soil until taken up by the plants. These special advantages are due to the fact that most all of its soil is reinforced by a substantial subsoil that is of a gravelly and clayey nature.

Second. While Delaware possesses quite a variety of soils, the common type runs between a Norfolk sand and a Norfolk silt loam. These soils are admirable for the raising of apples, peaches, pears, and, in fact, all fruits of every description.

The average date at which the last killing frost in the spring is likely to occur in any locality is a matter of great importance to the fruit grower, and perhaps the amount of rainfall during a season is of equal importance for successful fruit culture. For comparison let us consult the following table:

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Location.	Annual precipitation.	Annual mean temperature.	Date earliest fall frost.	Date average.	Date latest spring frost.	Date average.
Millsboro, Del., Sussex Co.....	44.42	55.1	Oct. 8	Oct. 20	May 8	Apr. 17
Storrs, Conn., Tolland Co.....	47.2	47	Sept. 15	Oct 10	May 29	May 8
Moorestown, N. J. Burlington Co.....	45.6	52	Oct. 3	Oct. 20	May 15	Apr. 23
Orono, Me., Penobscot Co.....	42.6	43	Sept. 12	Sept. 24	June 2	May 11
Fitchburg, Mass., Worcester Co.....	45.4	47	Sept. 14	Oct. 12	May 19	Apr. 28
Jacksonville, Vt., Windham Co.....	50.3	42	Aug. 27	Sept. 18	June 6	May 19
Martinsburg, W. Va., Berkeley Co.....	35.2	53	Oct. 1	Oct. 20	May 3	Apr. 16
Blacksburg, Va., Montgomery Co...	39.41	51.5	Sept. 22	Sept. 30	May 13	Apr. 25
York, Pa., York Co..	41.9	52	Sept. 19	Oct. 1	May 10	Apr. 25
Rochester, N. Y., Monroe Co.....	34.5	47	Sept. 26	Oct. 19	May 30	May 1
Cumberland, Md., Allegany Co.....	32.86	51.5	Sept. 23	.....	May 12	.....
Ashland, Oreg.....	20.2	52	Sept. 13	Oct. 14	May 9	Apr. 18
Washington, Yakima Co.....	8.9	50	Sept. 6	Sept. 21	June 14	May 23
Grand Junction, Colorado.....	7.7	55	Sept. 14	Sept. 29	Apr. 30	Apr. 11

It will be readily observed, as above indicated, that around central Delaware the climatic conditions are nearly perfect. The copious rainfall, together with the freedom from late erratic frosts, tends, in connection with the long growing season, averaging about one hundred and ninety days, to make ideal the chances for profitable fruit production.

The nearness to available markets places Delaware conspicuously in the forefront when compared with orchards located in the West and in not a few sections of the East. When distance alone is considered, all of Delaware is closer to New York city markets than is the greater part of New York State. There can be no comparison of distances between the Western apple sections and our own sections, as they are too one-sided. For instance, let us consider the following facts:

The price of unplanted orchard land in the Yakima or Hood River valleys averages about $300 an acre, while the same kind of land in the Potomac Valley can be had for $100 an acre on the average. For labor per day, fruit growers in Yakima and Hood River Valley sections pay $1.75 to $2.50, though the same kind of labor is gotten for $1.25 to $1.50 per day in the Potomac Valley. In this item of expense the advantages are very much in favor of the East, not to mention the occasional scarcity of even the ordinary kind of laborers in the far West.

While the yield and market values are approximately the same in the

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above-named sections, the East produces apples of finer flavor and quality of flesh, though the West actually raises finer looking apples, which are also better in keeping qualities.

The facilities for transportation are much better from the Potomac Valley as compared with the Yakima and Hood River regions. The rates from Potomac Valley to New York city per barrel or three boxes is from 28 cents to 32 cents, while from the Hood River Valley it costs about $1.86 per barrel. Icing charges to be added on the increased freight rates amounts to 75 cents more for three boxes when used. Their shipping season is until freezing weather, while from the Potomac Valley apples are shipped all winter.

It can be seen by a little study that the transportation charges alone on a barrel of apples from the West would represent quite a handsome profit. Granting that all other expenses incident to placing the apples on the New York city markets are the same, labor is much higher in the West than here in the East. Why should anyone go West and pay from $300 up to as much as $1,200 an acre on which to plant an orchard when here on this Peninsula the finest kind of land can be had for from $60 to $200 an acre? Here nature bountifully supplies rainfalls; there, in some sections, the fruit grower pays hundreds of dollars for the installation of irrigation systems which create an annual tax for water rights and privileges thereafter.

That apples grown on our Peninsula are of a more pronounced flavor than those grown in the West is unquestionable even in the minds of the ordinary housewife, not to mention the opinions of reputable fruit judges.

Credit must be rendered to the Western grower because of his stability in the apple business, which is due to the fact of co-operation and the practice of economic methods of orcharding. With the same careful precautions taken here in the East our great apple sections would become the greatest in the world. Just as soon as we can make the Peninsula known for its apples of superior quality there need be no further uneasiness on the part of the fruit grower in marketing a bumper crop at a profit.

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SPRAYING PEACH AND APPLE ORCHARDS

WITH SPECIAL REFERENCE TO FUNGOUS DISEASES.

JOHN W. ROBERTS,
U. S. Department of Agriculture.

The Department has been taking up spraying along the line of investigation of insecticides and fungicides. Along much the same line as its work on pure foods, the Department took up the examination of compounds that were used for spraying and has tested and analyzed them to learn whether the manufacturers were complying with the law as to full weight and the quality of the goods.

I do not think that I should start in with the a b c of spraying. I would like to talk about some of the work that we have done and to go over the results of fungicide tests. The lime-sulphur solution has been one of the leading fungicides for several years. Attempts have been made to find substitutes for it. Some of these substitutes are injurious to vegetation, and some seem to be very promising. After all the lime-sulphur is still in its old place. As I looked over your fine exhibit of apples I notice that some of them had sooty blotch, which is very easily kept off. For ordinary diseases we have three or four necessary sprayings of apples. One comes when the clusters are separated and the color begins to show. The second one comes as soon as the petals have fallen. The next spraying is about three weeks after the petals have fallen and the next about seven weeks later. Where scab is not serious the first application may be omitted. There is a new disease, interesting here because it has been found in Maryland and Virginia, the apple blotch. In taking hold of an orchard that needs to be renovated I should expect to find some of this disease. I am told that it is serious in western Maryland and in Virginia in certain localities. Ring rot is another trouble that has not received so much attention as it should. I mention it because it will probably be serious next year, for we have had a good deal of blight, and this trouble very often follows blight. It lives on the dead twigs of fire blight. In the summer its spores may be washed down and infect the apples below. I saw it on the apple trees along toward the end of the season in orchards in which pear blight had been a serious disease.

I have seen more or less bitter rot in this part of the country. I believe it is the worst thing we have to fight. I have been fighting it especially for the last two years. Where there are but few cankers on the trees the bitter rot is pretty well controlled by spraying with Bordeaux mixture, but in some parts of the country, or in orchards where the trees are full of cankers, Bordeaux

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mixture will not control it. The spores are washed down so profusely that it is impossible to keep the fruit covered with spray all the time. In one orchard we had so many cankers that whenever a rain came the spores came down in great abundance, and we could not put on enough Bordeaux mixture to cover every spot and keep the apples from rotting. The point is that orchard sanitation may be as important as spraying. In this connection pruning is important not only from the standpoint of fruit production, but it is also important from the standpoint of control of the disease. Spraying is too often considered a panacea for all ills. One of the important points is to know what you are going to spray for, then to spray at the right time and do a good job. Not long ago I saw a man spraying who kept his team going at a fast walk and he thought he was doing a good job of spraying. He was not doing it. The keynote is to know what you are spraying for, put the spray on at the right time, and make a thorough job of it.

Bordeaux mixture is the best summer spray for apples and it is probable that it will continue to be the best summer spray. Lime-sulphur is the spring spray, for use on dormant trees and in the earlier sprayings of the growing season. You should not use lime-sulphur on a hot summer day, for it may scald the fruit, but you can use Bordeaux mixture safely. We learned out in Kansas how lime-sulphur can burn apples during hot, dry weather. We can remember a good many years ago when an apple buyer would not ask about spraying, but after a while the benefits of spraying were appreciated by the buyers and now no buyer would look at fruit that he knew had not been sprayed.

I ought to say something about the self-boiled lime-sulphur because it is the very easiest spray to make, although most orchardists seem to think it is the hardest to make. I would not be surprised if some of you were to ask me if it is easier to make than Bordeaux mixture, and I answer that it is. You can not go wrong if you have good lime. The only thing you are required to do is not to put in too much water and not cook it too long. If you have a good clear lemon yellow colored fluid at the finish, you have then the self-boiled mixture. It is simply a mixture of lime and sulphur. No chemical action has taken place. To make the mixture you use 8 pounds of sulphur, 8 pounds of lime to 50 gallons of water, put your lime in a barrel, start it slaking, mix the sulphur to a paste and pour it over the slaking lime, and see that you have enough water to keep from burning, and keep it stirred well. You then dilute the mixture to 50 gallons and run through a screen into your sprayer. There is nothing at all to be frightened at, but you want to stop as soon as the lime is slaked—that is, you dilute with water before any chemical combination begins to take place.

In making Bordeaux mixture we used to insist that Bordeaux be made with diluted lime solution and diluted bluestone solution poured together into a tank. This is still the best way, but the power sprayer has helped us simplify the matter. With a propellor agitator start your engine and pour in either your bluestone and your lime from your stock solution into the nearly full tank, and after that is diluted put in the other solution, either the bluestone or the lime,

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whichever is left. A very good way is to run about 100 gallons of water into the 200-gallon tank, then put in the lime suspended in 50 gallons of water, and then pump in another 50 gallons, in which the required amount of bluestone is in solution. You then have 200 gallons of spray, as good Bordeaux mixture as anyone would want.

Mr. E. P. Walls—Is it advisable to try to make the Bordeaux mixture in this way when you have only a barrel pump?

Mr. Roberts—No, I would not trust this method with only a barrel pump, for you do not have sufficient agitation of the liquid.

Prof. C. A. McCue—I am glad to hear a representative of the United States Department of Agriculture say that good Bordeaux mixture can be made without first diluting the lime solution and the bluestone solution separately. I have been making Bordeaux mixture for the last ten years by putting the required amount of either lime or bluestone into the barrel or tank, and filling nearly full and then adding the other solution.

Mr. Roberts—You need the best Bordeaux mixture possible when you spray, especially for bitter rot, and for this reason we do not recommend the method suggested unless you have a power sprayer, which has a good agitator.

Professor McCue—At any rate the method suggested is not new. I would like to ask Mr. Roberts what his criterion is of a good Bordeaux mixture?

Mr. Roberts—I have seen many kinds and many grades. I have seen a Bordeaux mixture that would wash off during a rain at night immediately following the day on which the spray was applied. That was not good Bordeaux mixture. A good Bordeaux mixture has good covering and sticking powers, things that you may miss if you try to make it in a spray tank without good agitation. No one can tell you the exact difference chemically between a good Bordeaux and a poor Bordeaux mixture.

Mr. F. M. Soper—Can you eradicate bitter rot by spraying with Bordeaux mixture?

Mr. Roberts—No; we can not eradicate it, but in orchards where there are very few cankers it is pretty easily controlled by spraying. Where the cankers are numerous they should be cut out very carefully, and then the spraying should be done very thoroughly.

Mr. Soper—We spray thoroughly, but we could not control bitter rot on Stark trees by spraying. If our Maryland friends have much bitter rot, they should look out for it, for it is a very serious trouble and will cause great damage.

Mr. Roberts—We were called upon to do some work in the Middle West in a certain badly infested orchard and we failed to control bitter rot by spraying. We did it thoroughly for three years. We then cut out all cankers systematically, after which we were able to control the bitter rot without much trouble.

Mr. Soper—I pulled up my trees that had been paying me well because I could not control this trouble by spraying.

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Mr. Roberts—The spraying should be started by the first of July to prevent the bitter rot from getting a start.

Question—What has been the effect of spraying orchards with nitrate of soda?

Mr. Roberts—Some work was done in California with apparently excellent results. I tried it in the East last spring with only negative results, and the question seems to be very much up in the air. Applied to the soil nitrate of soda has been tried for the prevention of bacterial spot of the peach and appears to have some good effect, possibly by stimulating the trees.

Mr. E. D. Baker—I am very much interested in this discussion. We had a physiological trouble with our Baldwin apples and we found that the lime-sulphur solution would control it, but we found also that when we quit using the Bordeaux mixture the bitter rot became serious, so we returned to the use of the Bordeaux. The Bordeaux mixture also seemed to have some effect in preventing the twig blight.

Professor McCue—Do you know of varieties of apples that are immune to bitter rot?

Mr. Roberts—No; not entirely. There may be some degrees of immunity in certain varieties. Givens is one of the worst. The Jonathan is subject to blight and because of this fact it is more subject to bitter rot, for blight cankers often harbor the bitter-rot fungus and give a constant supply of bitter-rot spores.

Professor Temple—What about the Bismarck? Has it come under your observation?

Mr. Roberts—No.

Professor McCue—How about the Winesap?

Mr. Roberts—It is very resistant.

Professor Temple—I have seen a few Bismarck trees in Maryland and they seemed quite susceptible both to blight and the bitter rot.

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PEACH CULTURE

PROF. C. A. McCUE,
Newark, Del.

I have not very much to say about the peach situation. All of you who grow peaches know that there was a great oversupply of peaches last year and that no one made any money. This not only applies to the grower, but to the wholesaler and the retailer. It is an economic fact that in a year of glut in any one product that no one makes a great amount of money handling the product and everyone concerned feels lucky if he gets out whole. In talking with our commission man after the season was over he said that he never saw anything in his life like it and there was nothing in handling the peach crop but a whole lot of hard work. The point that we are most interested in is, What is to be the future of the peach? Is the glut of the peach markets a permanent thing? In discussing the situation there are several things to take into consideration. Since the last peach harvest I have talked with people from Virginia, West Virginia, and Ohio, and they have all told me that their growers were even more discouraged than ours. These people can not raise peaches any cheaper than we can; they can not even raise them as cheaply. Their transportation problems are greater, their packages cost more, and they can not produce as many peaches per tree as our growers can. Taking all things into consideration, most of them lost money and they were much discouraged. It seems to me that it would be foolish for the growers of this district to be discouraged and stop producing peaches. The glut of last year was a condition which has only come once in a generation, and it may be another generation before it comes again. The thing that made the glut this year possibly was, in a large measure, that every peach tree in the peach districts bore, and as a consequence there were many poor peaches and a lot of inferior fruit was thrown upon the market. The market was killed by the poor grades of peaches and there was no chance for the better grades. The Georgia people had a good grade of peaches and they made money. There are several things to do to stiffen the peach market. One is to stop putting culls on the market and another is to put up a better package. In Delaware last year I saw fruit packed in Georgia carriers that never should have been hauled to the railroad. Peaches were bringing fair prices at that time. Later on in the season the same men who packed that cull fruit left good peaches to rot on the trees. There is too much poor packing and too much cull fruit placed upon the market. There are too few growers who

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know how to put up a peach pack. Too many prominent shippers mix cars, shipping several varieties and several packs in the same car. The way to make money is to handle the fruit in carload lots, ship solid cars of one variety and of a uniform pack. One man can get two or three good men in his neighborhood to join him and make it a co-operative scheme and ship solid cars of one variety, say a solid car of Belle of Georgia one day, and perhaps another variety the next day.

The Delmarvia Peninsula is too well adapted to the production of peaches for us to not utilize it for that purpose. We are too close to the big markets to allow western fruit to drive us out of the business. The scale, yellows, and little peach about wiped out our peach industry in years past and other regions began to take our markets. We can control most of these troubles and it is time that we were winning our own back again.

WHAT VARIETIES OF FRUIT SHALL WE PLANT?

Picking out a variety of apples or peaches for another man is almost like going out and picking out a wife for him. We tell each man to choose his own wife because he is the fellow that must live with her. It is the same with varieties of fruits. A man must live with a variety and learn how to handle it; if he does not like that particular variety, it does not make much difference how good that variety is, it would be better for him not to grow it. We have not yet an ideal variety of any fruit. We may go farther and say that no two men have the same ideal for a variety. I doubt if we will ever have the ideal variety of any fruit—that is, fruit that no one can find fault with. If a variety is a good shipper, it may be poor in quality. If it suits one type of soil, it may not suit another type. In varieties the thing to do is to find out the good points and the bad points, weigh them against each other, and then make our choice. Fortunately, on the Peninsula we do not have a long list of varieties. New York has two standard varieties of apples—Baldwin and Greening. Outside of that they have a long list of from 100 to 200 that they can grow successfully, but they wisely confine themselves to two or three varieties. In the choice of varieties we have been wandering around from Dan to Beersheba and are just beginning to find ourselves. We are now settling down to a few good varieties, none of them, however, absolutely faultless. We tried many old ones and discarded them, and have tried some new ones and discarded them, and have gone back to some of our old ones. Our experience makes us very slow to pick up new varieties. I might name a half dozen new varieties that have excellent points and we might be successful with them. It takes time, patience, and money to try new things out. Do not go blindly into growing new varieties until their worth is established.

For standard early apple varieties we have the Yellow Transparent and the Early Ripe and Williams Early Red. Many of us have grown the Early Ripe and made money with it. Although it is a liberal bearer it is not handsome in color, bears biannually, and we are gradually discarding it. The Fourth of July will wait until a man gets a few gray hairs before it begins to bear. For a very early apple we have settled down to the Yellow Transparent. It has

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two or three bad faults. First, it is rather a hard tree to prune and to train to our ideal of a tree. Second, it is very subject to blight. Third, the fruit bruises easily and you have to use great care in handling it; but the most serious fault is its color. The American people do not take kindly to a yellow or green apple. They are attracted by red color. The English people prefer a green apple and do not care as much for a red apple. The Englishman likes an Albemarle Pippin, but the American wants something that is attractive to the eye. Four or five years ago a friend bought a peck of apples and told me what beautiful apples she had, and I asked her what kind they were. She didn't know. They turned out to be Ben Davis, and we had a great deal of fun telling her what a bargain she had. She resolved that never again would she be misled by the handsome appearance of an apple. A year after I was calling on the same friend and she said, "I have just bought a bushed of apples; they are beauties. I would like to know what they are." Ben Davis again. She soon forgot her lesson.

If we were to have an ideal early apple what would it be like? In the first place, my ideal variety would be one that would bear every year, be a good thrifty grower, not subject to blight, have fairly spreading head, be an early bearer, have red skin and good quality, be a good shipper, and would not bruise easily. Following the Yellow Transparent we have the Williams Early Red. The Williams has been the money-maker of the early apples. We would like it better if it was a little earlier, but it is good, and, ripening at the time it does, it falls upon the market at a comparatively vacant period. The Williams is a thrifty grower, but one of its greatest points is its brilliant color. It is a good bearer, has good size, but is shy on quality. The American buys with his eye, but not with his tongue, and hence the beautiful color of the Williams will sell it. We have been saying for years that the Ben Davis would be discarded, but the Ben Davis is still on the job and it looks as though it would always be on the job. It sells on account of its color. The public is, however, beginning to discriminate, and an apple of good quality will sell better than one of poor quality. From Yellow Transparent to Williams Early we have not very much to offer. Following Williams we have a number of varieties that we have tried, but have not found any of them to be of any great value. Some growers in Delaware are making money out of Red Beighenheimer. It is a big apple, but poor. Another man is making money out of North Western Greening, a few are growing Oldenburg, and some grow Gravenstein or Fanny. From Williams to early fall we have no standard commercial variety that is a good commercial proposition. There should be something after Williams. I can not say what, but think there should be something to fill in that vacant space. If a man is growing peaches, he does not want an apple variety that comes in at the same time with peaches. For us the next apple of merit is the Jonathan, but it does not make an ideal tree, nevertheless the fruit is ideal after you get it in your mouth. The Jonathan has two serious faults—one its tendency to blight; it will not stand too much forcing; and second, its tendency to go wrong in cold storage. A number of our growers are learning to put Jonathan on the market immediately after it

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is picked. It is questionable if it will pay, as a general practice, to hold Jonathan in storage for an advance in price. The Philadelphia market knows Jonathan and it brings a fair price there. Outside of Jonathan's liability to spot in cold storage, it is a good apple. One point we do not know is, how long the tree is going to last. All our trees are still young. I had some experience with Jonathan before coming to Delaware, unfortunately, however, I knew the apple in a district north of the best range for Jonathans. There when the Jonathan got old it had a tendency to become a poor bearer. Only the future can tell what it will do here in that respect. It has one peculiarity in its manner of production that is in its favor. Many of our apple trees produce their fruit only on spurs that are on wood two years or older. In other varieties you will find the fruit buds produced also on the one-year-old wood. Jonathan produces fruit buds in both ways, hence it ought to be, and is, a regular and early bearer. Best of all, when you sell a barrel or box of Jonathan you are not afraid to look the buyer in the face the next time you see him, because you know that you have sold him something worth while. Grimes has two bad faults: First, its color, and second, it is subject to a rot working on the trunk at the surface of the ground, thus making it a comparatively short-lived tree. It is also subject to woolly aphis. It is a good annual bearer. The color does not make it a good seller. There is always room for some Grimes on this Peninsula and there will always be a good special market for it. Once the public know it they will call for it again. The next apple in time of ripening is the Stayman. Every fruit district, if it wants to be famous, must specialize. We people here on the Delaware and Maryland Peninsula are learning that we have a mighty good chance to specialize on Stayman apples. Stayman is rapidly becoming known abroad and all over the entire United States. In Columbus, Ohio, a few days ago I was talking with a horticulturist and he said, "You come from where they raise the Stayman apple." A man from California also said the same thing to me. We already have a reputation for growing good Stayman and we have an opportunity to make this Peninsula the Stayman district of the United States. We will have to watch our laurels, because others are learning to plant the Stayman, for example, in Virginia and West Virginia; but the New Jersey people are the people we must look out for. They can grow just as good a Stayman as we can and grow it just as cheaply as we can. The Stayman has its faults and some of them are very serious ones. One fault is that unless soil conditions and sunshine are just right the apple does not color well. It is a variety that gives a good healthy red color under good conditions, but on clay soil it is poorly colored and unattractive. It has a tendency to make many sizes, ranging all the way from small to large will be borne on the same tree. This necessitates a great deal of grading in the packing house and gives too many small grades. Someone says thin. Thinning is all right in certain instances, but thinning will not correct this fault altogether, and it costs money to thin, and it may be better for large orchards to keep down this expense. In large orchard operations it is necessary from the standpoint of low cost of production to cut out every possible expense. In small orchards the high cost of production is often offset by the high price for a fancy product.

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The low cost of production must come when there is a large quantity produced. The apple grower must decide this point for himself. The Stayman has a tendency to crack at the stem. This year many of them did. It is probably due to some physiological peculiarity. The flesh grows faster than the skin and splits it open. Take away that excess pressure and the skin may resist the strain and go through all right. This can be done by reducing the amount of water in the soil. The Stayman is a regular and early bearer. It is easy to grow and takes kindly to training.

There is a great deal of confusion in the name of the Paragon. Almost anywhere except in Delaware and Maryland you will find the apple we call Paragon known as the Arkansas or the Mammoth Black Twig. The question is raised, Are they one and the same? I do not believe they are. The true Arkansas is the Mammoth Black Twig, but I believe the Paragon is a different apple. They are both Winesap seedlings. The Mammoth Black Twig is rather flat and gets very dark around the stem and with a greenish cast at the blossom end. The Paragon is more of the shape of the Winesap, but does not have the greenish cast, and runs small. The Paragon originated in Tennessee, the Arkansas in Arkansas. The nurserymen have mixed them up. If you ask for Paragon and Mammoth Black Twig, he will send them to you and probably take them all out of the same row. Possibly you can pick them out in the row after they come into bearing. There is one thing to commend the Paragon—the fruit is of an even grade in color and size. It does not compete with the Stayman on the market, because it comes on after the Stayman is out of the market. The Paragon in some sections has a tendency to become a shy bearer.

Next comes the old Winesap. We are in the Winesap section, and if a man has Winesaps and can overcome its tendency to run small there is no better apple to grow for profit. One of the reasons it runs small is because the tree does not get enough to eat. In many cases it will need thinning, but I believe that most of the necessary thinning for Winesap can be done with the pruning shears. Do not leave too much wood in the tree. The Winesap is a good storage apple. It has good flavor, good color, and its greatest drawback is its tendency to run small.

There are a few other varieties grown here. The Nero is a handsome apple, good size, grades up well, but is of indifferent quality. It has a fine color, but I am inclined to doubt whether Nero will ever prove to be one of the best commercial apples for this district. We have a district where we can grow such apples as the Stayman and the Winesap and we should cater to quality. "Apples of quality" should be our slogan. I do not believe we could put Nero in that class. The same thing applies to the York Imperial. It is ill-shaped and hard to pack and you can not count on it year after year. It is usually healthy, but is sometimes affected with hairy root. We have been using York as a pollinater for Stayman and Paragon, which are generally considered to be self-sterile and intersterile varieties. While I have had no chance to experiment upon them, I have almost come to the conclusion that Stayman will pollinate itself. It is still an open question, however, and one that should be solved.

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The Rome Beauty is not high in quality and is not an early bearer. It is a miserable tree to handle, and has a tendency to produce limbs out at an angle that will form bad crotches. I might mention the Ben Davis. We can grow it as fine as anywhere in the world, but I believe our slogan should be "apples of quality." If you are going to search for other varieties to grow, search for one to fill in the season between Williams and Jonathan.

Just a word about peaches. We have grown a great number of varieties of peaches in this State. Years ago we could grow almost any variety of the Persian strains of peaches, such as Early Crawford, Late Crawford, Old Mixon, etc., but we found that they were not hardy enough and we have turned to the newer type of Chinese Clings and their seedlings, of which the Elberta is the leading variety. The more I see of peach growing the more I believe we want to eliminate many of our varieties and bring our list down to two or three. We do not want anything that conflicts with the Georgia or New York season. There are a number of excellent peaches we might name. One early one that we can grow is the Miss Lola. Whether we ought to grow it in commercial quantities is a question. The Champion we should discard, as it is too subject to rot and too poor a shipper, and also inclined in wet seasons to be a cling. Then there is the Carman, an excellent peach, that comes in before Champion. Carman will come into the market before Georgia stops shipping Elberta, and unless you have a local market it would be safer not to plant it. The Belle of Georgia has one slight fault—it is not an excellent shipper, but it is high in quality and the people are coming to appreciate it. In some places they prefer Belle of Georgia as a canning peach. The buying public has learned that the Belle of Georgia is of good quality. A new variety has come to notice lately, but I have not seen enough of it to be sure of my ground. It looks good and has a good reputation where grown. It is the Hale. It is claimed that it is a larger fruit and a better shipper than the Elberta. If it does not fall down in quality, it may be the coming peach. In the southern part of our peach district we perhaps need one more variety. We finish the Elberta a little too soon in the season and we need something to come in a few days later than Elberta. One of the best we have seen is the Francis, perhaps a heavier cropper than the Elberta. It may run small and it needs thinning on the trees. If I were to extend the season any more, I would go to the extreme end and grow a very late peach. Not the Salway or the Gold Drop. I have been quite impressed with Krummel's October. It is a peach of an excellent rich flavor and where the people are learning it they are coming back each year for it. I do not recommend planting it on a commercial scale, but it is well worth trying for local markets. There are a number of others that are good, but they should not replace those that have been named, and we should limit our varieties to a few in number.

Mr. Soper—Have you had any experience with the Red Bird?

Professor McCue—Last year we fruited it for the first time and it is one of the most beautiful peaches I have ever seen, but I do not think it would be profitable to plant on a commercial scale, as it is a clingstone. It is grown in the West for canning purposes. When it comes in here the market is getting

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freestone peaches from Georgia. I do not think there would be a great demand for it. It would not conflict with the Belle of Georgia, but the peaches grown in Georgia. Georgia peaches come in when Red Bird is ready.

Professor Pailthorpe—I was talking with a man from the West about Red Bird and he claimed they raise them only as a canning peach and not for an eating peach. They like a good cling and find the Red Bird the best they have. We do not want peach-canning factories in the East because we are not sure enough of our crop.

Mr. Nichols—Do you know anything about the Iron Mountain?

Professor McCue—The Iron Mountain is a big green peach like the Ford's Late. It is a very successful market peach in New Jersey. I am a little doubtful if it would be a good peach to grow for carload lots. It would be good for local markets.

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THE SORTING, SIZING, PACKING AND STORING OF FRUIT.

EDWARD L. MARKELL,
United States Department of Agriculture.

The subject that has been assigned to me is such a broad one that I shall only attempt to strike the high points in my discussion. When fruit harvesting and storage is mentioned one usually thinks of apples, so I will confine my attention mainly to that fruit.

The first thing to consider in the harvesting of the apple is the time to pick. This is a much more important point than is commonly believed, especially if the fruit is to be placed in storage. Ask a fruit grower how ripe an apple should be before it is picked for storage and the chances are nine out of ten that he will say that the greener it is the longer it will keep; and this seems fairly reasonable. A green tomato will certainly keep longer than one that has colored up. We have all found that out. But apples and tomatoes are differently constituted. A tomato is eating ripe as soon as it is well colored, but an apple is not. In fact, an apple does not usually become mellow and good to eat until some time after it has acquired its highest color. We say that an apple is mature as soon as it is fully developed and well colored. Investigations carried on by the Department of Agriculture have demonstrated very conclusively that an apple should be fully developed or mature in order for it to keep longest and best in cold storage. Tests have been made with a large number of varieties of apples, but one example will serve to illustrate the point. Rome Beauty is an important variety in the Pacific Northwest. The growers often start to pick the apple as soon as it begins to color up, and the whole crop is frequently picked before it is well colored. Representatives of the Department of Agriculture made three pickings of the variety at intervals of ten days. The first pick was made when the first commercial pickings were being made and the last pick was made considerably after the last commercial picking. These lots were all placed in cold storage and inspected at the end of three and a half months. The results of the inspections are shown on the charts.

The following table shows the results of a series of experiments with the Rome Beauty apple:

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TABLE I.—ROME BEAUTY—MATURE VERSUS IMMATURE FRUIT.

(Per cent of bad scald and decay at withdrawal from storage, and after a holding period of ten days under market conditions. Three-year average. Withdrawals made at six-week intervals. Time in storage at first withdrawal three to three and one-half months.)

Withdrawals.	First.		Second.		Third.		Fourth.	
	Mat.	Immat.	Mat.	Immat.	Mat.	Immat.	Mat.	Immat.
BAD SCALD.								
At withdrawal.....	0.0	0.0	0.0	26.5	1.4	62.0	4.3	72.6
Ten days later.....	2.1	65.3	6.6	79.5	10.6	98.1	18.7	89.6
DECAY.								
At withdrawal.....	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4
Ten days later.....	0.3	0.6	0.3	0.0	1.9	12.9	3.6	23.7

The table shows the results at four withdrawals from storage, in January, the middle of February, late March, and May. At the first withdrawal no scald showed up, either in the mature or the immature lots. They were then held under ordinary market conditions, and at the end of ten days only 2.1 per cent of the mature fruit had developed scald, in striking contrast to which is the 65.3 per cent of scald in the immature fruit. At the second withdrawal the mature fruit was still free from scald, but 26.5 per cent, or more than a quarter of the immature lots, had developed scald before removal. Ten days after the last withdrawal 18.7 per cent of the mature fruit showed scald, in contrast to 89.6 per cent of the immature fruit—less than one-fifth of each box in the one case against almost nine-tenths in the other. Such differences speak for themselves. Fungous decay also developed late in the season. Ten days after the last lots of fruit had been removed from storage the decay in the mature fruit amounted to 3.6 per cent, but the decay in that picked before maturity reached 23.7 per cent.

The results secured with this variety are exceptionally striking. A greater amount of scald developed than commonly occurs with other varieties, but Rome Beauty is notoriously susceptible to scald.

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ESOPUS (SPITZENBERG), EFFECT OF OVERMATURITY.

(Per cent decay at withdrawal from storage, and after a ten-day holding period under market conditions. Time of withdrawals similar to Table I.)

Withdrawals.	First.		Second.		Third.		Fourth.	
	Mature.	Overmature.	Mature.	Overmature.	Mature.	Overmature.	Mature.	Overmature.
DECAY.								
At withdrawal.....	0.0	2.3	0.0	9.1	1.3	4.0	2.7	14.0
Ten days later.....	1.3	2.3	1.3	25.0	2.7	26.0	6.7	36.0

Upon the first withdrawal, early in January, the fruit packed when overmature showed 2.3 per cent decay, while that picked at maturity showed no decay at all. Even at the second withdrawal from storage, in the middle of February, there was no decay in the mature lots, but 9.1 per cent in the overmature. Ten days later the decay had increased to 25 per cent (one-fourth of each box) in the fruit picked when overmature, and was only 1.3 per cent in the fruit picked at maturity. Considering the fact that the mature fruit for this experiment was picked before commercial pickings of that variety in that particular section had started and the last pick was made before the last commercial pickings, it is interesting to speculate how much of the Esopus (Spitzenberg) from this locality was fit to use when it reached the consumers.

Picking too late is of just as much importance as picking too early. In some sections of the country the growers compete with one another in their efforts to secure a very high percentage of red on certain varieties. Jonathan and Spitzenberg are both good examples. The paintings show the condition of two apples after their removal from storage. The perfect apple is representative of a box that was picked when just mature, the decayed apple represents the condition of one-fourth of a box of apples picked when overmature. The first apple was picked before commercial pickings of this variety had been made; the other considerably before the commercial pickings had been completed.

These few examples will serve to emphasize the importance of picking at the proper time. Just how to determine the correct time is a problem for each grower to work out for himself. Indications of approaching maturity are numerous, but no one taken by itself is reliable, as any one may be produced by abnormal conditions, such as disease, insects, etc. Recognized signs of maturity are: The changing of the ground color of the apple from green to creamy or yellowish, the presence of brown or black seeds, rich color for the variety on the fruit exposed to the sunlight, flesh slightly yielding to the touch, stem snapping readily from the spur when the fruit is twisted upward, and the presence of drop apples on the ground. When all or a majority of these indications are present on a variety throughout the orchard the grower may safely assume that it is time to pick.

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In picking apples every effort should be made to avoid injuring them. A perfect apple is pretty well able to take care of itself. It is moderately well protected by its skin, but as soon as this is punctured or torn a point of entrance for fungus spores is opened, and once disease gains a foothold it is practically impossible to stop it. Therefore the utmost care should be exercised to prevent injury in any of the picking or packing operations.

After the fruit is picked it should be packed as quickly as possible. The importance of good grading and sizing is beginning to be recognized everywhere. In the past this has all been done by hand, but experience has proved that sizing can not be done economically on a large scale in this manner. The sizing is now being largely done by machinery. Machine sizers were first used in the box-apple sections of the West, but their use is spreading rapidly through the eastern apple sections. Several machines have been designed for eastern conditions and are well adapted for use in the barrel sections. Among the best sizing machines used in the East are the following:

1. The Schellenger Fruit Sorting Machine, manufactured by the Schellenger Fruit Sorting Machine Co., Chicago, Ill. Price, $225.

2. The Hardy Fruit Grader, manufactured by The Hardy Manufacturing Co., Hudson, Mich. Price, $90–$125.

3. The Britton Fruit Grader, manufactured by The Britton Grader Co., Rochester, N. Y. Price, about $65.

All these machines are being used successfully in many localities. The last mentioned is the simplest and cheapest and it appears to do just as good work as the others.

While machines will take care of the sizing, the actual grading will probably always have to be done by hand. This is strictly a matter of judgment. Apples are sorted into first, second, or third grade, according to their degrees of perfection. The first grade should consist of apples that are free from blemishes of all kinds and are of good color for the variety. The second grade fruit should be equally free from blemishes but may be of poorer color. The third grade is composed of good sound apples, but they may be slightly misshapen or have other defects of a minor nature. All fruit showing disease or insect injury should be kept out of the general market. It may be used locally or, as is frequently the case, it may be sold in bulk to cider mills or drying factories. Each grower has his own idea as to what constitutes a first or a second grade apple, and unfortunately these ideas differ greatly. As a result a first-grade apple does not always mean the same. One man's first grade is often no better than another man's second grade. This brings up the importance of the standardization of grades. A general standardization of grades in all apple-growing sections is something to be strived for, but it appears to be a long way off. The best that we can expect at present is for the individual grower, or possibly a group of growers, to standardize their output and establish a reputation for a certain brand. I have in mind an apple grower who a few years ago decided to establish what is known as his "Red Stave" brand. He had three staves in each of his barrels dyed red, and

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then proceeded to fill them with as honest a grade of fruit as he could. The apples made a hit on the market and the brand was easily remembered. As a result this man has had more orders than he could fill.

A number of Eastern apple growers are attempting to pack their apples in boxes. Some of them have been very successful, but others have decided that it did not pay. It is very doubtful if, as a general proposition, it is advisable for eastern growers to pack much of their fruit in boxes. The western growers have spent years in developing their industry. They have put all of their brains and energy into mastering the problems of sizing, grading, and packing, and we all know how well they have solved them. It hardly seems reasonable to expect that the eastern grower can beat them at their own game from the very outset. It generally costs the eastern grower considerably more at first to pack in boxes than it does the western grower, and this will tend to offset the difference in freight rates between the two places. The western fruit is more attractive in appearance than the eastern and it is usually sized very accurately and well packed. It is a difficult proposition to secure eastern box apples that will successfully compete with those from the West. On the other hand, the box is a good package and there is no reason why the growers should not make use of it to at least supply the local demand of their communities. Much can be done to improve the barrel pack, and it would seem best for the grower to perfect this package before attempting to develop another.

Apples should be stored as soon as possible after they have been packed. The apple is an organism and, like every other living thing, it has its definite length of life. During its growing period the apple stores within itself food material that is capable of preserving its life for a considerable length of time after its removal from the tree. These food products are mainly starches and sugars, and by the chemical changes which occur in the apple during the ripening process the starches are changed into sugars and the sugars gradually break up into simpler compounds. It has been found that a cold temperature will slow down the chemical changes. The object of cold storage is therefore to postpone the final breakdown or death of the fruit by checking these developing processes. It is a well-known law that with each increase of 18 degrees Fahrenheit the rapidity with which chemical changes take place is increased from two to three times, or applying this to fruit storage, at 50 degrees temperature the chemical changes which ultimately result in the death of the fruit would occur at least twice as rapidly as at 32 degrees. Thus the conclusion to be drawn is plainly that the lowest temperature at which the fruit can be held without danger of freezing is the one most favorable to its length of storage life. Fruit has been placed by the Department of Agriculture in sold storage, part held at 32 degrees and part at 35 degrees, and the results were briefly as follows: The first two inspections, in January and February, showed very little difference in the amount of scald or decay in normally good-keeping apples held at the two temperatures. However, at the third and fourth inspections, made toward the end of their storage life, the fruit held at 35 degrees showed considerably more decay than that stored at 32 degrees.

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In apples with a shorter storage life the differences were shown even in the first two inspections. These results are additional proof to the effect that low temperatures retard the ripening processes, and that as these processes are quickened by higher temperatures the length of life of the fruit is shortened and its susceptibility to disease increases.

Even after many years of successful cold storage of apples many persons cling to the belief that cold-storage apples will not keep as well upon removal as apples that are held throughout at a higher temperature. The Department investigations give very conclusive evidence that this opinion is erroneous. Apples from the same lot, placed in and removed from cold and common storage at the same time and held after removal under similar conditions, practically always favor the lower temperature, especially if removed fairly late in the storage season. Apples held in common storage are usually removed by January or February, while those in cold storage are often kept considerably later. People are apt to compare apples removed from common storage early in the season with those taken from cold storage a good deal later, and this is obviously unfair. Apples held in any kind of storage until they are overripe will undoubtedly deteriorate very rapidly upon withdrawal to a warm temperature. Just as cold retards ripening in storage, a cool temperature is best for fruit when held for any length of time after its removal from storage.

Many growers are interested in the problem of providing local storage space for their apples. In spite of what has been said regarding the effects of temperatures higher than 32 degrees, it is not always practicable to build a cold-storage house. Cold-storage warehouses represent a large amount of capital in building and equipment, and also require a large operating capital. Some communities are justified in raising funds for a cold-storage plant, but many are not. It is nearly always possible, however, for a small community, a group of growers, or even one large grower, to build a common or air-cooled storage house that will satisfactorily provide for their necessities. A common storage house of very large capacity may be built for six or eight thousand dollars, with slight operating expenses, as against fifty or a hundred thousand dollars and large running expenses for a cold-storage plant. Many common storage houses have already been built in various sections of the Northwest, and the Department of Agriculture has inspected many of them, held their fruit in several of them in the past, and has this season originated more extensive work with this type of storage.

Two essentials to be secured in the construction of a storage house are good insulation and an effective system of ventilation. Both of these are of utmost importance. A building must be well insulated to maintain a uniform temperature, and this is necessary if the fruit is to keep satisfactorily for any length of time. Even the briefest consideration of the details of construction and materials necessary to secure proper insulation would exceed the limits of my time, but it is highly important that the common storage be constructed to permit the minimum passage of heat or cold through its walls.

Ventilation is the next important consideration, and this may be achieved

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by simple air shafts, or more complicated systems, employing electric fans in the shafts. It is essential that outside air should not be admitted to the storage house when it is warmer than the air within the house.

Uniformity of temperature is a most important consideration in a common storage house. It is better to hold the fruit at 40 degrees than to bring it down to 32 degrees at night and allow it to jump up to 45 degrees during the day. During the early part of the season the temperature in a common storage house will probably remain relatively high, especially if cold nights are none too plentiful. The daily receipts of warm fruit prevent the lowering of the temperature at a very rapid rate during the harvesting season. Fruit picked during the day and stored while still warm carries a large quantity of heat with it into the storage room, and when the boxes are stacked considerable time is required to reduce them to the temperature that they would reach if simply left in the orchard over night. After all of the fruit has been received it is a rather simple matter to reduce and hold the temperature at the point desired. Thirty-five degrees is about as low a temperature as most of the common storage houses maintain, but in some cases 32 degrees is reached and held. In either case the length of time in the fall during which the fruit is held at a high temperature shows itself in the shortened life of the fruit. Early in its storage life an apple will show as little decay in common as in cold storage, but toward the middle of its storage life the difference becomes quite marked. In short, common storage may be as satisfactory as cold storage for fruit that is only to be kept until about the middle of the winter. Fruit to be held for longer periods should be placed in cold storage.

It seems entirely feasible to divide a common storage house into various compartments, each of which could be filled with fruit as rapidly as possible, and then held at a uniform temperature. This would render the common storage more nearly as efficient as the cold storage, but until some such plan has been worked out the preceding statement must hold.

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NUT CULTURE.

By J. S. KELLEY,
Preston, Md.

The culture of nuts is at last beginning to receive the attention it merits. A few decades ago people wagged their heads when the advocate of nut culture passed, just as some centuries since doubting Thomases had tapped their heads when Columbus passed. The tribe of head-waggers is not yet extinct, but they are only holding on to life by their eyelashes. Some of the change of heart has come through the Government reports on the value of nuts as food. Most nuts far outrank meat in strength-giving qualities and wheat bread is a puny diet in comparison. Nuts have this additional and highly valuable advantage, namely, that they are distinctly laxative, while both meat and bread are distinctly binding on the intestinal tract. As to the flavor of nuts, well, when your mother bakes the bread incomparable you praise it by saying it has a nutty flavor.

When the grains have exhausted the soil of the Northwest men will awake to the fact that far richer kernels have been abandoned to squirrels and wood rats, and that this superior kernel can still be produced in unending qualities on the same soil that wheat now refuses to grow on. This because wheat, like all annuals, sends its roots down but a few feet, then spreads them out in the rich surface soil, exhausting it in a few years, but leaves the deeper levels untouched. Tree roots, on the other hand, dive deeply into the soil and spread far and wide, finding abundant food where wheat roots could not penetrate. If, in addition, it is fed the same plant foods that are annually given to wheat, we are sure to get that much better crop in return.

The soil and climate of this Peninsula are well adapted to the growing of all hardy nuts, and all are profitable except the Japanese Walnut, whose thick-shelled nut does not sell well. The past year was not such a good one for the nut growers of the Peninsula, because of the dry weather during April and May, which caused many blossoms on the various nut trees to fall. Of all nuts now grown on the Peninsula the English Walnut has probably the greatest future, as the market for this nut is steady, the demand far exceeding the supply, as we annually import nearly $20,000,000 worth of foreign nuts. The commercial growers must be sure, however, to plant varieties that are known to bloom late and to be cold resistant, such as the Pomeroy, Rush, Nebo, and others. Budded trees come into bearing several years before seedlings, and, above all, you know just what kind of a nut you are growing. Insist on trees budded on the black walnut stock, as such trees will resist the coldest winter and bear heavily.

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Just here I can not resist the temptation to say a few words in behalf of our native walnuts, which have been sadly neglected by our plant breeders. Their shells are thicker than those of the English or Persian Walnut, but their kernels are far richer in oil and flavor, lacking the acrid tastes so often met with in the Persian Walnut. With persistent effort our nuts could be bred with thin shells, such varieties having been found in the wilds in the past, and destroyed before their value was generally known. The Persian Walnut has today a thin shell, but it has not always been so. The original form of the Persian Walnut, as found today in Persia along the shores of the Caspian Sea and northern China, is a small nut so hard that it would almost bounce from under the hammer. So very unlike are they that botanists were at first inclined to consider these wild trees a different and distinct species from the Persian Walnut we cultivate. Not only is the shell very thick, but the partitions that divide the nut are also thick. Cultivation has reduced these inner partitions to a papery membrane. Yet we know that the cultivated nut is a direct descendant of these wild Persian trees. The Greeks having first started the good work with nuts from Persia, the Romans borrowed it from the Greeks and handed it down to us through the French and English. These centuries of improvement were not years of plant breeding, but a mere hit or miss affair.

The same is true of the fruits we cultivate, nearly all of which are chance seedlings. Science has concluded that only one seed in ten thousand ever lives to become a fruiting plant. One chance in ten thousand has given us the fine things in our orchards. If a hundred seed in ten thousand were allowed to grow up to maturity, we would soon top graft our Grimes and Winesaps to something better. Give our native nuts another chance in the ten thousand, and history will repeat itself. In its experiments with seedling pecans from selected nuts the Department of Agriculture has found that one-third of the seedlings bear fruit smaller than the parent nut, one-third equal to the parent nut, and one-third larger than the parent nut.

While we earnestly advise everyone to plant a few nuts, we would advise the commercial growers not to plant any but the budded trees, on account of the very variation in seedlings that we have built such hope upon. "Who plants a seed plants hope," says the poet, but the man who plants nuts for a living must plant certainty. Even he, though, can find a place in his dooryard or hedgerows for many seedlings.

Of the eleven species of Hickories native to America only three are cultivated, and only one is grown commercially, the Pecan. The Government has brought to the public attention a few fine varieties of the Eastern Shellbarks, but they are only grown in a small way by such far-sighted men as Dr. Morris, of New York. The Hickory tribe is peculiarly American, nothing remotely approaching them being found elsewhere. This should appeal to our patriotism to make this peculiarly national nut family worthy of our people.

The Southern Pecan is already a thing to be proud of, and is highly profitable when budded trees of known value are planted. This species is native as far north as Knoxville in the East, and southern Iowa in the West. The

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far southern varieties are apt to suffer in our winters, but the varieties that originated in Virginia, Kentucky, and Indiana are hardy as oaks and bear heavily here. The nuts find a ready market and good prices. It will not be long before local varieties will appear that will be even better suited to our conditions than these hardy Virginia forms.

Of the many chestnuts cultivated on the Peninsula the Paragon seems to present the most advantages, combining hardiness, productivity, and quality, standing next to the native nut in flavor. It is more or less affected, however, by the deadly Japanese blight, which seems bent upon exterminating everything not Japanese.

Of some other nuts the Filbert or Hazel nuts are occasionally planted, but the susceptibility of the European Filbert to the Hazel blight has discouraged its planting. Natize hazels are not injured to any extent by this blight, and offer a promising field for the plant breeders and experimenters.

Almonds are not planted to any extent, as all but the hard shelled bloom so early that the young fruit dies in the late spring freezes, and the plum weevil stings what few nuts are left. Yet the varieties will surely be bred that will meet all conditions, just as was done in California, where the word "Almond" for years was a byword and jest. The same will occur with the Pistache nut, which, as far as known, has not been tried on the Peninsula.

Just a few words now on the by-products of the nut industry: First in value is the production of oil, which in European countries assumes huge proportions. The smaller and less marketable nuts are sent to mills, where the oil is pressed out and sold for use in cookery, in medicine, and as a drying oil for paints. Next comes the timber, which would in time become a regular product as trees become too old to be profitable. In France the Persian Walnut is budded on standard black walnut trees, so that when the nut-producing age is past they have a fine stick of black walnut to sell. We are already at the end of our supply of black walnut timber, and may in the near future begin to import this American wood from France, a condition not highly flattering to our intelligence.

The blockade of Germany has cut off the stream of dyes that has flowed from that country, and we suddenly awake to a sense of our dependence for such a necessity on a foreign country. To remedy the trouble partially the manufacture of three colors has been revived by native firms. These colors, yellow, brown, and black, are made from the husk of the black walnut and butternut. Why not make a permanent thing of this new industry that will surely stimulate nut growing? Every native industry should give active encouragement to every other native industry, especially to those that will use the by-products of its own labor.

In closing I earnestly urge the people of this Peninsula to recognize now, as they are sure to do later, the great superiority of nuts as food over the common garden crops, and that they plant nut trees where they have been accustomed to plant mere shade trees. Nut trees usually give better shade than elms or ashes, and cost actually less at the same nursery. But the elm gives nothing but shade, while the nut trees give annually a delicious food that

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is both food and medicine. To those troubles with sluggish intestines I say eat nuts, especially oily nuts like the black walnut, and the doctor will visit you less and maybe turn his hand to nut growing. Many children suffer from habitual constipation, which would disappear rapidly were nuts given to them regularly. The doctors' drugs yield temporary relief. Nature's nuts' oils give a permanent relief.

Be just to your little ones and yourselves—and plant nut trees.

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WINTER WORK IN THE ORCHARD

S. B. SHAW,
Pomologist, Extension Service, Maryland Agricultural College.

Mr. President, Ladies, and Gentlemen:

It is presumed most of you are growers of fruit or else interested to some extent in the production of orchard crops. Fruit growing is no new business and, as in other occupations and industries, the successful producer must consider carefully every operation connected with the development of his product. During the winter months it is excellent time to plant not only for the coming crop but for those of successive years. At this season most effective work can be done in directing the structural growth of trees; in developing new fruiting wood and in the partial control of insects and diseases.

Much has been written and a great deal said regarding pruning, yet we still find repeated evidence of the lack of a thorough understanding of the basic principles of this operation. Probably more knowledge, thought, and experience are required in pruning than with any other orchard work. It can not be intelligently practiced unless the grower has some idea of the fruiting habits of the different orchard trees and their individual characteristic forms of growth. As a rule the amateur or grower who is not a specialist in orcharding handles his trees in one of two ways. Either they are allowed to make their natural growth without any attempt whatever at training or else each tree is pruned in very much the same way without regard for the difference in the method of fruit bearing in each of the principal orchard fruits.

In general the apple and pear may be considered together since their plan of bearing is much the same. The fruit is borne almost entirely on small, crooked, short branches, commonly called fruit spurs. The characteristic growth of each of these spurs and their habit of bearing is such that they usually produce fruit in alternate years, continuing their slow growth for some time. Thus it is evident that the grower who expects abundant crops from his apple and pear trees must practice a system of pruning that will keep the trees sufficiently open and healthy and at the same time retain as many as possible of these small spurs just so long as they remain productive. Avoid severe pruning at any one time, as the tendency will be for the trees to grow water sprouts, which will not develop fruit spurs for several years.

The plan of bearing with the peach is about as different from that of the

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apple and pear as one can well imagine. The peach always bears on the new or last year's growth of wood instead of on the older shoots or spurs. The fruiting part of the tree moves along the branches and does not remain stationary, as with the apple and pear. More severe pruning can be practiced to advantage on the peach as it develops a vigorous growth which means an increased amount of fruiting wood. Short twigs are often useless after one year and can then be cut out altogether. Because the method of bearing with the peach is progressive, the main leaders should be cut back each year to try and keep the fruiting wood down closer to the body of the tree. By this system there is not so much danger of having limbs break down under a heavy load of fruit.

In pruning young trees the operator should consider the individual characteristic growth of different varieties. This is particularly true with apples, as the variation in growth of peaches is not so pronounced. As a tree is pruned, so will it very often grow. The grower must decide upon the desired shape and general arrangement of the limbs of each tree. Do not cut here and clip there in a haphazard way, but with each cut have some well-defined purpose in view. Cut to the bud that is pointing in the direction the limb is to grow and in most instances the subsequent growth will be as desired.

The grower of any fruit tree anxiously awaits the first crop. After this it is a question whether the same feeling of anticipation is aroused over the prospects of succeeding crops. Be this as it may, in the first years of growth every effort is put forth to produce and mature fruit spurs at any place they may appear on either body or main limbs. If it were not for one very troublesome disease of the pear and apple, this would be an excellent practice. Because of the injury done by blight it is perhaps advisable to remove fruit spurs and small twigs from the body and main limbs, particularly on those varieties which are more susceptible to the attacks of this disease. There may be, however, some varieties which are not so severely attacked by blight. Where this is the case it is a good practice to encourage the development of as many as possible of the fruiting spurs regardless of their position.

In addition to the removal of excess wood, all dead and dying wood should be cut out. By all means remove as much as possible of diseased wood, no matter how small. Blighted twigs, cankers, and decaying wood can be removed to excellent advantage. While this practice may be tedious and entail some additional expense, it is often a very effective means for the combating of certain diseases, particularly those that can not well be controlled by means of spray materials.

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NOTES ON INSECT CONTROL

E. N. CORY,
Entomologist, Maryland Experiment Station, College Park, Md.

The time is not long past when the spraying of fruit and truck crops was practiced by but few growers; today the farmer must fight insect pests almost continually, and most of his energy expended in this direction is used in the application of insecticides. Hence the amount and value of the insecticides used has increased greatly.

Fundamental knowledge of the principles of insect control are not alone sufficient today, because the margin between profit and loss is so small that more than a superficial knowledge of the principles is necessary. The farmer of today must know how to get the greatest possible value, in terms of control efficiency, for the money expended in insecticides and equipment.

Based upon the number of bearing apple and pear trees in the country, it has been estimated that approximately $7,000,000 worth of arsenate of lead alone would be necessary to give the trees the sprayings that are necessary to secure perfect fruit.

With numerous chemical companies in the field, each believing that their insecticides are the best that can be manufactured, and each, through the best salesmen they can command, urging their products upon the grower, it is small wonder that he is often in a quandary as to which product is the best for his purpose. Add to this the rival claims of the many manufacturers of sprays for the control of scale insects and the problem becomes even more complicated.

Therefore any light that is shed upon the efficiency of sprays is of great value in dollars and cents to the horticulturist, particularly at this time, when the metals are advanced in price and almost out of the market.

ARSENATES OF LEAD.

There are two arsenates of lead upon the market. The acid arsenate, diplumbic or lead hydrogen arsenate ($PbHAsO_4$), and the neutral, triplumbic or so-called ortho arsenate ($Pb_3(AsO_4)2$).

The latter has been shown to be a basic lead arsenate, and not a true ortho arsenate.

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The specific gravity of any arsenate should be low in order that it may remain in suspension for some time and spread evenly over the foliage.

The acid or diplumbic arsenate has a specific gravity of 5.786, while the basic arsenate has a specific gravity of 7.105. This would indicate that the acid arsenate will remain in suspension longer, and this has been borne out by experiments.

Acid arsenate has been shown to kill much more quickly than the neutral arsenate, possibly due to the fact that it reacts more with other substances than does the basic arsenate. On the other hand, the acid arsenate in combination with lime-sulphur reduces the lime content, causes the deposition of free sulphur, and forms soluble arsenic compounds in excess.

The basic arsenate in combination with lime-sulphur reacts but little, there being but little lime or sulphur lost and very little more soluble arsenic formed.

From these data, then, we may conclude that the acid or diplumbic arsenate should be used for spraying, when no lime-sulphur is used, since it kills more rapidly, remains in suspension longer, and spreads more evenly.

The neutral triplumbic or basic arsenate should be used in combination with lime-sulphur in order to lessen the injury from burning due to soluble compounds formed in the mixture. This costs a few cents more per pound than the acid arsenate, but is worth the difference when the possibilities of injury are considered.

The truck grower should use the acid arsenate; the fruit grower the neutral arsenate. Ascertain from the chemical company with which you deal whether they carry both.

SULPHUR SPRAYS.

The new developments in dormant sprays are interesting. The concentrated lime-sulphur remains our standard, though certain sodium and barium compounds with sulphur have been on the market for some time.

We have tested some of these products, finding their effects on scale to be generally good.

The sodium sulphides should not be used in combination with arsenate of lead as a foliage spray since soluble sodium arsenic compounds are formed. Barium sulphur compounds can be combined with arsenates with safety.

Spraying experiments on orchards badly infested with San Jose Scale in the spring of 1915 with dry sulphur compounds showed "B. T. S.," "Niagara Soluble Sulfur" and "Kiltone Sodium Sulfide" to be efficient in controlling scale, while "Modoc Spray Sulfur" did not give as good results.

The labor of mixing was more tedious probably to some extent offsetting the reduced cost due to freight saving. The operators complained that the dry compounds were more caustic and disagreeable to handle than the concentrated lime-sulphur.

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TOBACCO EXTRACTS.

Tobacco extracts must be counted upon as the best summer contact sprays for general use on sucking insects, such as orchard and truck crop plant lice, whose control offers one of the greatest problems with which the growers have to contend.

There are three orchard plant lice that are of major importance to Maryland and, presumably, Delaware growers, namely, the green aphis, which usually infest new growth rather late in the season; the rosy apple aphis, so called because of its reddish hue, which infest fruit buds, and the oat aphis, which is usually found around the swelling buds and which appears before either of the others. The rapidity with which these pests multiply necessitates prompt measures for their suppression.

We have found that orchards that are sprayed extremely late in the spring are usually kept practically free of the oat and rosy aphis by this dormant spray, because there are usually sufficient warm days in the spring to hatch aphis eggs before it is too late to spray. We recommend spraying in the spring, as late as practical. If late lime-sulphur applications are not practical, the grower should use a separate spray of "Black Leaf 40," at the rate of three-fourths of a pint to 100 gallons of water, to which has been added three-fifths of a pound of soap. This mixture will cost about $1.15 per 100 gallons. This should be applied when the aphids have clustered on the expanded buds. If later applications are necessary, due to the later hatching of eggs of the rosy and green aphids, the "Black Leaf 40" may be combined with the codling moth spray, but soap should be omitted in lime-sulphur combinations, as it forms an insoluble soap that will clog the nozzles.

The pea and melon lice are the most serious aphids with which the trucker has to deal. Pea lice live for approximately eight months of the year on clover, preferably climson clover, hence the first measure against the pea louse should be to remove the pea field as far from clover as practical, or if it is necessary that both be close together, the clover should be turned under early in spring.

Careful watch should be made in April for the first aphids and spraying should take place very shortly after they are first observed.

A tractor sprayer, with nozzles so arranged as to direct the spray over the top and both sides, is the best machine to use. Four rows can be sprayed at once with such a machine. Use "Black Leaf 40," 1 to 640 parts of water, or 10 ounces to 50 gallons, plus 4 pounds of fish oil soap.

Using 75 gallons per acre, one application will cost approximately $2.80 per acre, including labor of two men, team, and materials.

The same mixture is effective on melons, but the cost will be higher, as the vines must be turned over and back again, since the aphis cluster on the under side of the leaves.

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TESTS OF POISONS.

We have in progress a series of tests of the comparative value of various insecticides, both combined with fungicides, with stickers, and alone, applied to potatoes. These tests show some interesting indications.

Arsenate of zinc, next to paris green, seems to be the most rapidly acting poison. The addition of a molasses sticker, 1 gallon to 50 gallons of spray, increased the efficiency of all sprays. Soap, 4 pounds to 50 gallons, as a spreader, also increased the efficiency of the mixtures. Bordeaux, plus the arsenicals, showed excellent results and, where blight has been prevalent, should be used by all means. In general, it may be said that too much arsenic is being used and not enough care to secure thorough spraying. For example, 6 ounces of paris green has been found to be effective when used with soap as a spreader. Probably our final recommendation will be for the use of Bordeaux-arsenic, spreader or sticker mixture, with a reduction in the amount of the arsenical over what has been sommonly used.

Mr. F. M. Soper—What is the remedy for rose beetle?

Professor Cory—I have not done any original work to control rose beetle, but if arsenate of lead is used with Bordeaux mixture, say 4 pounds of arsenate of lead to 100 gallons of the mixture, and a gallon or 10 pounds of molasses or glucose in the same 100 gallons, you will find it a very good remedy for the rose beetle.

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REPORT OF COMMITTEE ON FUNGUS DISEASES

THOMAS F. MANNS,
Delaware Experiment Station.

It is my aim to keep you in touch with plant pathological problems in the United States as well as summarizing our own problems. At the present time the Secretary of Agriculture has established foreign quarantines against all five-needle pines from Europe and Asia on account of the white pine blister rust. With all the efforts of the U. S. Department of Agriculture has made, the disease in Massachusetts and other States has almost gotten beyond control. Many new areas of infection have broken out the past season. Should the disease ever get beyond control and obtain a foothold in the great pine districts the loss will be in the millions. This pine rust has for its intermediate host the cultivated currant. The quarantine against powdery scab of white potatoes from Maine and New York has been lifted. The reason for this has been the fact that the powdery scab has been proven to be unable to carry over in southern and south central districts. The limiting factor is probably climatic conditions, although soil evidently has something to do with it Soil sent from Delaware to Maine, in which was placed potatoes literally covered with powdery scab failed to develop the disease when grown under Maine conditions. Likewise seed badly infected from Maine failed to develop powdery scab when grown in Delaware. Similar work done at other southern or central experiment stations gave the same results. The fact that the quarantine has been raised from Maine and New York has in no way affected the quarantine against Newfoundland, St. Pierre, Miquelon, Great Britain, Germany, and Austro Hungary. Shipments are permitted from the Dominion of Canada only under certified inspection by American inspectors.

A quarantine against sugar cane and citrus stock from all foreign countries is in force owing to several cane diseases and citrus canker, a bacterial disease. A quarantine is in force against corn from Java and India because of a serious disease.

The shipment of nursery stock by parcel post, the inspection in some cases being carried on by the United States Department, will be a possibility the present year. For small shipments this will prove a great help to the nurserymen.

PROGRESS IN PLANT DISEASE CONTROL.

The steaming of greenhouse and seed-bed soils by a system of perforated pipes laid 6 inches to 9 inches deep and 18 to 24 inches apart, or by the inverted-pan method, has proved a boon to growers under glass as well as to

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those troubled with seed-bed difficulties. In the Irondequoit trucking district, near Rochester, N. Y., I saw the system in extensive use the past summer. Also in the growing of gensing under glass in Wisconsin Dr. Jones reports splendid success.

The use of electric ventilating systems in storage houses, for quick changing of air and forcing in cold air at night and during proper occasions, has been successfully used in New York on cabbage, and I believe the same would be of considerable value with us for use on apples, where we attempt to carry them without cold storage facilities. The Delaware Experiment Station, in co-operation with the Bureau of Plant Industry, Division of Horticulture, has been experimenting on a forced system of ventilation and drying of sweet potatoes, to prevent soft rot and other diseases. There is some promise of success with this system, in conjunction with heat from stoves, and at small initial cost to those having electric conveniences.

DISEASE RESISTANT STRAINS.

More and more the pathologists and horticulturists are recognizing the importance of selecting and breeding for resistant varieties or strains. This is particularly true for the many wilt diseases which are persistent soil troubles—tomato wilt, cabbage wilt, watermelon wilt, cantaloupe wilt, flax wilt, cotton wilt, etc. Remarkable results have been made with cabbage during the past three years by Professor White, of Maryland, and Dr. Jones, of Wisconsin, and others. Efforts to obtain resistant strains of tomatoes have not been so successful, though Professor Norton, of Maryland has shown some results. This tomato problem is one of the most important problems the Peninsula has to meet. Professor Edgerton, of Louisiana, has shown us a rapid greenhouse method of finding resistant plants and probably greater progress can be made. This consists of steam sterilizing soil and reinoculating with the Fusarium wilt. The disease works so much faster in steam-sterilized soil that in a short time resistant plants may be selected.

A year ago the committee in its report called attention to the urgent need and the important field on the Peninsula for the breeding and selecting of varieties and strains resistant to the many wilt diseases which are so destructive. I am convinced that there is a need for a worker at each of the stations along such lines. This work would include the development of resistant strains of tomatoes, cabbage, cantaloupes, watermelon, cucumber, white potato, sweet potato, egg plant, and many others. The importance of the tomato alone demands such a man to spend his entire time on the project. The losses from tomato wilt each year amount to many thousands of dollars.

THE WHITE POTATO SITUATION.

The present high price of potatoes ($1.10 to $1.25 wholesale in Philadelphia) makes us think "what we did with our summer's wages." The past season it was almost a question whether we could afford to pay for digging and marketing our early potatoes. Last spring the Maine storage men felt

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about the same, with their potatoes being quoted on the Philadelphia market at from 20 to 30 cents. With somewhat of a shortage in production and a heavy outbreak of late blight, extending from Maine to Wisconsin and as far south as central Delaware and westward with the prospects for a heavy rot in storage, it looks as if the prices will remain at top notch for several months.

APPLE AND PEAR BLIGHT.

We have experienced the past summer one of the most disastrous outbreaks of fire blight. In my judgment this may be accounted for because of several factors, (1) the first ascent of sap was delayed till very shortly before blossoming time—the early blossoming of apple and pear was associated with a plentiful nectar flow, and (2) this was later much interfered with by rainfall, and (3) the soft and rapid growth of all trees.

The writer, noting the rapid progress of the disease, at the Delaware experimental orchard, after the use of a colony of bees, thought there might be some possibility of the blight organisms carrying over winter in the honey. Upon culturing the honey it was found that this supposition gave negative results. However, Professors Gossard and Walton, of the Ohio Experiment Station, showed that the organism causing blight may live in honey for forty-seven hours and cause 52 per cent of infection. They were also able to show that in the honey dew of aphids (green lice) the organism could live for seventy-one and three-tenths hours. These studies show possibilities of the hive being a center for rapid distribution.

The past season the disease has been found on cherry, plum, and peach to a limited extent. From Washington State it has been found on cherries and on Yakimine, which is a cross between a prune and a peach. We are sincerely hoping that the organism will not become adapted to and a menace on peach, cherry, and plum.

CONTROL OF PEAR BLIGHT ON THE PACIFIC COAST.

I am convinced that we will make no progress in controlling apple and pear blight until our orchardists co-operate to the extent of making demands both upon the legislatures and the experiment stations for assistance. The disease has been so disastrous the past season, and will continue to be at intervals, as to call for more drastic methods in its control. We have districts in Delaware, and probably the same thing is true for Maryland, in which it would pay to maintain a trained pathologist, whose duties would be to aid in inspecting orchards for various troubles, especially pear blight; men who could quickly assist owners in picking out blight cankers (on trunks and branches) as well as other diseases, and give detailed instruction for cutting out and caring for the same. Then, by means of proper laws, orchards not properly taken care of could be cleaned up and the expense taxed against the owner. A system of this kind has been in practice in certain districts in Oregon with a considerable degree of success. Of course, it can never take place unless there is a determination on the part of orchardists that they will

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have the work done and done right. No group of experts or legislators has ever been successful in forcing such measures upon fruit men; it must come from a determination of the orchardists to bring it about, and this can take place only by a strong and earnest co-operation among the growers.

When Professor Waite (1905) was sent by the U. S. Department of Agriculture to California to assist in handling the extensive outbreak of blight on pears, particular stress was laid upon the necessity of complete eradication of the blight in large areas, rather than single efforts in individual orchards.

Smith, the plant pathologist of California, in his 1906 report, writes: "The general plan of work adopted during the past winter was to locate a man or party of men in a given area and have them systematically inspect every pear and apple orchard, tree by tree, in that district. They were then to mark the trees condemned for removal on account of blight in the butt, instruct the owners in the methods of blight eradication, assist in training their help for the work, and finally to reinspect after the work had been done.

"In practice it was found necessary in inspecting trees for blight, not simply to walk through the orchard looking for blighted limbs, as at first seemed sufficient, but each inspector had to be provided with a gouge or chisel and make a thorough examination of the butt and trunk of every tree, in order to detect the frequent cases of hidden blight at that point.

"We feel satisfied that the method of treatment adopted is not likely to be improved upon, save perhaps in some details. We have followed out some lines of original investigation to a limited extent, and hope to push them further; we have also obtained observations of value on local features of the blight, but the general principles laid down still hold. The pear growers of California, and we whose province it is to assist them, must look the problem in the face and make the most of the circumstances. Avoiding undue enthusiasm and extravagant claims, we feel justified in saying that in our experience in the control of pear blight since 1904, this much has been established:

"1. That thorough work in winter eradication prevents blossom-infection in spring.

"2. That the larger the district which can be covered in winter the less will be the infection next spring, and all the infection will come from blight which remained over winter.

"3. That so long as sources of infection remain over winter, producing infection even in well-worked orchards near by, frequent, prompt summer cutting and removal of butt sprouts and spurs must be practiced in order to prevent serious damage and loss of trees.

"4. That if not exposed to extremely abundant infection from neglected trees near by, a pear orchard can be profitably maintained in good condition and cultivated, pruned, and irrigated in the manner necessary to secure a crop, by thorough winter blight work and prompt cutting and sprout removal. The farther away the blight can be held the less will be the trouble.

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"The general application of the work requires, with all growers, education; with some, persuasion; with a few, force. Practically the greatest difficulty in a general, systematic clean up has been to induce the growers to do the work with any degree of efficiency and sufficiently early in the winter so that our inspectors could thoroughly examine the orchards and get the remaining cases out before the new season arrived. It is often difficult to get help to do the work properly, or the owner does not realize its importance. The varying quality of human nature in this regard can only be partially improved by exhortation and argument. Few actually refuse to do the work, but many slight or postpone it. This is the most serious difficulty to be met. Our horticultural law gives the county commissioners power to force the work, and in a few counties this has been done to great advantage, but in general the varying status of the boards in different counties, and the not unnatural disinclination of local members to create trouble with their neighbors, render hopeless the general application of the law under present conditions.

"It appears to the writer that the desired end is most likely to be attained by stationing permanent, competent inspectors in the various pear-growing centers under State authority, and keeping them there the year round to aid, instruct, urge, and encourage the growers in blight eradication. In the larger districts this force should be supplemented at county expense. Outside aid, such as that from the U. S. Department of Agriculture, could be distributed to the best advantage in the State.

"With such a force of local inspectors, especially if given authority to enforce blight eradication, conditions should be so adjusted as to assure the competency of these men, and their supervision by expert authority.

"It is hoped to adopt this method as far as possible during the coming year, stationing the men available more permanently and with less idea of covering the whole territory in regular order than was the case last year. This will afford all growers who desire aid every opportunity of obtaining it, but in large districts will put the responsibility of how much is accomplished toward a general clean up more upon the growers and the county."

In order to get first-hand information on control of pear and apple blight in the West, I have written to those in the States of California, Oregon, and Washington, on methods used and their success. For the benefit of the Horticultural Society, I have brought this correspondence and reports with me. Should you care to have a committee look into the details and offer resolutions looking to blight control, I will be glad to point out items of interest.

METEOROLOGICAL FACTORS IN 1915.

The season of 1915 opened with exceptional weather for early preparation of fields; but the promise of an early season was later doomed by heavy rains and continued cold weather. In fact truckers never experienced much more delayed conditions, due more to excess rains and cool weather. However, the orchardist establishing young trees found the conditions very favorable. The early tomato and early truck growers were never more discouraged. The

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lateness of the season farther south held southern truck on the markets long after the season for profit was past, thus making a poor market for both northern and southern growers. The heavy rains interfered much with pollination and fertilization of apple and tomato. The hail, rain, and wind storms caused unusual loss to nearly all crops, corn suffering equally with the rest.

SOME PREVALENT DISEASES OF THE SEASON.

Apple.—In addition to the bacterial or fire blight cankers, there has been an epidemic of black rot leaf spot and limb and trunk canker, also bitter rot leaf spot and limb cankers. Many young trees have been killed by the activity of these diseases.

Blotch (Phyllosticta solitaire E. & E.) is another apple trouble that is becoming more prevalent. It is difficult to control with the summer lime-sulphur sprays. Bordeaux is quite superior in its control.

Bean.—The bacterial blight was very prevalent again this season. All the bush string beans are very susceptible. The Cornell Station reports a bean resistant to anthracnose, the so-called rust of bean.

Cabbage.—The Fusarium wilt or yellows was exceptionally severe. This disease has not become generally prevalent in the lower part of the Peninsula. It will be severe when it does reach there.

The Phoma wilt or black leg has shown up much more active this season, causing total losses in some cases.

Cantaloupe.—The leaf blight (Alternaria brassica, Var. nigrescens) was very disastrous, causing much loss in some of the districts. Bordeaux has not been given a thorough trial on this disease. The use of a portable spray boom has been recommended.

Chestnut.—The blight is continuing in epidemic and is sweeping everything before it. No control measures have been successful.

Maple.—The anthracnose has been quite common and severe. Thorough and early spraying with Bordeaux will control this trouble.

Peach.—The fungus of brown rot has also been active as a blossom and fruit blight, not so severe though as in other seasons.

A bacterial leaf and fruit spot has proved quite difficult to control. The thorough use of a dormant spray (using Bordeaux) is suggested in control of this trouble. Further study and work is needed upon this disease.

Potato.—Fusarium blight has been active again this season. Much of our land is probably infected, and our home-grown seed often becomes diseased.

Late blight was found quite active, in some places causing considerable rot in late dug potatoes.

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Sweet Potatoes.—The Fusarium wilt or yellows of the vines was less prevalent than usual, due probably to the coolness of the season. Although the sweets were quite watery at digging, they went through early storage in good shape, owing to splendid fall drying.

Sycamore.—The anthracnose or leaf trouble was again active. This appears to be different from the maple trouble. It can be controlled by Bordeaux spraying.

Tomato.—Fusarium blight or sleeping sickness was again active, causing thousands of dollars worth of losses. This is a soil trouble and resistant varieties will be a successful means of avoiding loss.

Watermelon.—Anthracnose, or fruit rot, was very prevalent. There are good possibilities for obtaining resistant strains.

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THE BLIGHT OF FRUIT TREES

PROF. C. E. TEMPLE,
College Park, Md.

Dr. Manns has discussed the blight in his report on plant diseases, and in my remarks I will endeavor not to duplicate too much what he has said. The fruit growers of the Peninsula have witnessed the worst epidemic of blight this year that they have ever known in their history. It is the worst I have ever seen and I do not doubt but that it is the worst epidemic that has ever occurred in this country. It is almost impossible to estimate the amount of damage and loss that have resulted from it. In some cases 90 per cent of the fruit spurs have been killed. I presume all of you know what causes the disease. You may not know, however, that in the early days it existed in this country, as far back as 1845, when no one knew what caused the trouble. Some said it was caused by an insect, one writer said it was caused by excessive heat from the sun, that evaporation was too great, but in both cases they give the remedy the same as we have it today. It must be cut out one or two feet back of the diseased part and the branches burned. This is practically the remedy we recommend at the present time. The disease is caused by a microscopic organism so small that hundreds of them could lie on the point of a needle. Of course they are so small that no one has seen them with the naked eye, but when they are accumulated in masses you can see them. Sometimes they cover the whole surface of a twig, and by the use of the microscope it has been made perfectly clear now that they cause the disease. This organism is as tender as any life that you can mention. It is, therefore, easy to kill when it comes in contact with adverse conditions, such as heat and drought. The problem of controlling the disease is largely solved by cutting out the hold-over blight. Out of one thousand blighted twigs, only relatively few carry the disease over from one season to the next. The symptoms of the disease as we have observed them begin something like this: Starting with the hold-over cases rather than with cankers, a bit of diseased tissue which contains the living organism is not killed during the winter and here the germs start to multiply in the spring. These hold-over cases are very important in the control of the blight. In the spring you will see a yellow ooze coming out of a blighted twig and this ooze is full of organisms. Insects feed upon this ooze and carry the disease to the flowers. The bees come along and visit these flowers and carry the infection from blossom to blossom until an epidemic is caused. In this way a few hold-over cases of blight may be the cause of a very serious epidemic. The blossoms may be killed and the

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disease stop there, or the fruit spurs may be infected, or still further, the disease may extend into the branches and these infected branches may send out great quantities of ooze, which is carried about by insects so that secondary sources of infection may spread the disease very widely. Aphids, the ant, the tarnished plant beetle, and other insects are the agents for distributing this disease, or any insect that feeds on the tender shoots of the trees. The disease usually enters through the tender tissues. This secondary infection may carry the disease from branch to branch and from tree to tree, where it may enter the large branches or attack water sprouts, or sprouts from the roots, and from these various branches they may enter the trunk of the tree, in which case we call it body blight, but it is the same disease that we call twig blight because it ordinarily attacks twigs only. If there are water sprouts from the roots, the blight may descend through them and cause root blight. Collar rot is a trouble that follows something else, usually blight. The blight germs wash down to the ground and enter the tree through some opening in the bark and blight may girdle the trunk at the ground, and collar rot follows in this bark and wood that have been killed by the blight. So we must study all the symptoms of the disease before we are ready to attempt its control. Professor Manns has pointed out the fact that there are certain cardinal points that must be kept in mind. A friend of mine bought a large tract of land in the Hood River Valley some years ago and found upon starting work in his orchard that the blight had become established in practically all the orchards in that valley. He, with others, began organizing to control the disease, and after five or six years he told me that there was very little blight in the Hood River Valley. This shows that the disease can be controlled there and it can be controlled here. Systematic work by thorough organization can do it.

It is impossible to tell this year how severe the blight will be next year. It is a peculiar disease. You may have a slight infection this year, a little more next year, and so on until there is a severe epidemic, and then the next year there may be very little blight. It seems that there was an epidemic in 1845 and there have been a number of epidemics since.

In attempting to control the disease the first thing is to cut out all cases, as nearly as possible, of hold-over blight, between apple harvest time and when growth starts in the spring. You can accomplish more at this time than at any other period. The hold-over cases are the particular thing that you have to contend with. It is not always easy to tell a case of hold-over blight, but usually you have no trouble. If you follow down the blighted twig, you will find here and there rings where the bark is cracked. You may find several of these rings down the same branch. They indicate stages of the disease—that is to say, the disease advances some inches down the branch and then a dry spell perhaps causes it to stop and a ring or crack is found in the bark. Then a rain comes and the disease starts again and makes another advance down the branch. Whenever the crack extends entirely around the twig it shuts off the sap supply. The branch dries rapidly, the leaves turn black, and the leaves become conspicuous. If the disease does not advance any more this summer, you may be almost sure that it will not advance from

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that point next year. But if the bark does not crack away from the healthy bark, and the dead bark continues to be supplied with moisture, the organism is capable of living until next spring, and you have a case of hold-over blight. You will have to learn to know whether the organism is living or dead. The main thing is to find the hold-over cases and cut them out. In doing this the knife or other instrument used should be sterilized, and also the cut surface of the twig or branch or body, or whatever part of the tree was blighted, using corrosive sublimate at the usual strength. If you are not willing to go to all that trouble it is hardly worth while to attempt a campaign to control the disease. Have a sponge at the end of a string and apply the fungicide to the cut and to the knife. Concentrated lime-sulphur might be used. It has some advantages over the corrosive sublimate, as it is more penetrating, and it will protect the wound for some time after it is applied. Also you can tell by its color when the wound is thoroughly covered with it. If it is possible to remove all hold-over cases of blight, the control of the trouble is practically sure. However, it is impossible to get all the cases, and it is important to inspect an orchard very carefully in the spring just before growth starts to get the cases that have been missed. Do not select a cloudy day for this work. You want a good light so that the diseased areas can be easily seen.

One man can not control this trouble, because if he cuts out his blight ever so carefully and his neighbor does nothing, the disease will be brought over from that neighbor's orchard. You can never control the blight unless you have co-operation. I spent three years in the Northwest, where I found the most active co-operation, and we must learn the lesson here. Knowing how to control the blight will not accomplish anything unless it is put into practice in whole communities. Ordinarily it does not pay to try to cut out the blighted twigs in old trees in spring or summer time. The most important thing in summer time is to save the life of young trees. Watch these trees carefully, going up and down the rows every week, and whenever tender branches show blight cut them off. This will prevent the blight from going down to the larger branches or trunk of the trees.

There have been some bad cases of pear blight on the Eastern Shore and I am inclined to think that the apple grower would do well to take out his pear orchards, unless you have a profitable variety. Pears are more susceptible to blight than apples and the disease lives over in them more easily. You should also look after the service berry, or any other tree that is subject to blight. Finally, you should select varieties that are not susceptible to the disease. This last year young Bartlett trees were simply ruined, while young Kieffers blighted very little in comparison. Some varieties may be susceptible when they are young and much less susceptible when they get older. Any tree that grows rapidly is more susceptible than slow-growing trees. A young Bartlett is more susceptible than an old Bartlett. Along the same lines all of you know that certain varieties of apples are more susceptible than others. Jonathan and Yellow Transparent are among the worst. We may in time develop varieties by crossing and breeding up and selecting so that eventually we may have orchards that will not be devastated by blight.

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Something can be done by treatment of the soil. In districts where irrigation is practiced the water supply can be cut off when the trees have made their growth and then they ripen up their wood. We can not cut off the water supply, but we can by cultivation, by a proper use or withholding the fertilizer, and by skillful use of cover crops we can so control growth as to lessen the amount of blight. The main points, then, are to remove all cases of hold-over blight, to have perfect co-operation in the community, to select varieties that are not too susceptible to blight and to prevent too succulent growth by proper soil treatment.

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GRAPES

JOHN BUTTERY,
Smyrna, Del.

The subject assigned me for discussion, namely, grapes, the production of which occupies so small a place in the work of the people of this Peninsula, has been so ably discussed and reported in former years that I fear I would be encroaching upon the time of this convention and taxing the patience of my hearers were I to enter into any lengthy comment upon the subject.

I do not set myself up as an authority upon the propagation and cultivation of this fruit, but what I have to say I will say from the standpoint of the average grower. There is no doubt in my mind whatever but that this Peninsula is well adapted to the cultivation of grapes. I have not always lived in this section of the country. I came from the Chautauqua Grape Belt, through your much-respected and lamented friend, Joseph E. Carter, and I think we can produce, one year with another, a better grape than the famed Chautauqua region. One thing, we can always get them ripe, which is something the growers up there can not always do. This aspect of the case is much in our favor and ought sooner or later to bring us our great need, a grape-juice factory, "a consummation devoutly to be wished," for I think it would be the means of building up a large and profitable industry, profitable not only to the grower, but to the manufacturer as well.

Until that times arrives there is a very serious problem to face, a problem which is growing more serious year by year, the putting our grapes on the market for the table and the individual consumer.

There was a time when the section of country around Smyrna grew practically all the grapes of the Peninsula, and that in a very limited way, so that each individual grower put his fruit upon the market through his commission man, in whatever condition and package he pleased, and, the quantity being limited, ready sale was found and prices were good. But with the large additions to the Smyrna acreage and the development of the vineyards in other sections a condition of affairs somewhat discouraging has grown up, and is causing a very great loss to the larger growers and a very bad name for the Delaware grapes. I refer to the putting of poor, sour, worthless fruit upon the market, expecting the market to continue to take such fruit at remunerative prices. For instance, Jones has a small vineyard. He says, "New York and Philadelphia are large; I'll hustle mine in while prices are high, before

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the other fellow, and I'll get good money." The Smiths and a hundred other small growers in different sections of the Peninsula think the same way, and in go several hundred cases, or thousands of baskets, to a multitude of commission men, and in a few days the result is a crowded market; nobody wants Delaware grapes. "No good! I'll wait till the New York State grapes come in, and then I'll get something fit to eat." Why? Because New York State growers have learned that with their large acreage they must put upon the market something good, something the people come back and buy more of, because they are fit to eat and they like them. As I said in the beginning, we can grow as delicious grapes as New York, and if we only could have them put upon the market in an honest, honorable way, with our small acreage they ought to bring good money, and the demand far exceeds the supply. My observation is that about home many of the growers have forgotten what color our grapes are when ripe. They think the Moore's Early is a red grape, while you all know it is a fine, large black. That excellent, delicious, creamy, and sweet white grape, the Niagara, is now green and sour, and its enviable reputation is fast passing away. It is left on the stalls to rot, and the grower must accept anything, or nothing. It seems to me if there is any one sin of which the Peninsula people are guilty it is the sending of immature and unripe fruit to the market.

I once heard of a fairly honest grape grower who had a dream something like this: He dreamed he was taken suddenly ill, and died. He presented himself for admittance at the pearly portals of Paradise. The guard inquired his name and occupation in the world he had just left. The supplicant soul answered that his name had been Joseph Johnston, and his occupation that of a fruit grower. "What country and State are you from?" "I am an American from the State of Delaware." "Did you grow grapes down yonder?" "Yes, sir." "Did you pack an honest basket of fruit? I ask this of you, sir, because I have had to turn away so many from that little State because of this injustice of theirs to their fellow-men." "Well, sir, so far as I was able I tried to pack a basket I would have been willing to buy myself or give to a friend." The guard said, "Pass in, my friend, pass in!"

Mr. President, is this part of the country rising to the position it ought to occupy? Are these broad, fertile fields and sunny acres, lying so contiguous to the great markets of our country and of such easy access to the large markets of Europe, producing the returns they should? Does it not seem a shame for such land, in such a place and such a clime, to be producing so much wheat and corn and pasture when it might well be decked with gardens and vineyards and trees?

But you say the market would be overstocked. Not for good fruit that the people could eat. Now, in the case of grapes, the fruit under consideration, the conditions that obtain now should not be tolerated. There ought to be some way of giving the honest man an honest chance. For the sake of the good name of the States in which we reside there must be some supervision of the product. What is government for if not for the betterment of the conditions of its citizens, and it seems to me that there ought to be ways and means provided to protect the growers and the reputation of our Peninsula.

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I am taking up too much time, but I want to mention a few things I have observed the past year. If you are going to grow grapes in Delaware, you have to be in earnest about it. You have to spray, and spray thoroughly. Black rot is always present; the rose bug is ever on his job in the spring; the Fidea, or grape root worm, is increasing rapidly; the leaf hopper is becoming alarmingly plentiful; and in a season like last year the mildew makes terrible destruction. I am not able to take up these points in a scientific way, but if anyone has any question to ask I will try and tell them what I would do.

There is one other question I should like to mention—that is the question of package. For many years I believe the standard package has been the 8-basket carrier. For five years I have been using the handle basket. Mr. J. F. Moore, of Dover, has been using the same package. We were brought up to that package, which fact I suppose accounts for our using it. I myself think it a neater package and far more convenient for the consumer. It may be some more trouble for the grower, but I am confident it sells better. It is not a friend of the commission men of New York and Philadelphia, but they are much less averse to it than formerly.

This season there was a great landslide toward the basket in our neighborhood, and it was well for the growers who slid, for had they not had this package so as to ship in carload lots to outside points (which points almost demand a basket) the great crop of peaches would have barred the way of profit in the cities of New York and Philadelphia. Even as it was many carriers did not more than pay expenses. For my part, I did not ship a grape to New York last year.

Mr. S. H. Derby—I would like to ask Mr. Buttery what he would do for the rose bugs?

Mr. Buttery—There are two things that you can do: You can catch them and kill them and you can spray for them. Take 50 gallons of water and add 3 pounds of arsenate of lead and one-half gallon of black molasses or glucose. Put this on with a fine spray just before the grapes come into blossom. This will not destroy them entirely, but it will lessen them considerably. The question of grape growing is such a small one on the Peninsula at present; but we should greatly increase our acreage. If we want to make our Peninsula what it should be, we must grow everything we can, and grow it in large quantities. We can produce grapes abundantly and nowhere can they be grown better or finer or more profitably than here.

Mr. M. O. Pence—How many acres would it be necessary to have to keep up a grape-juice factory?

Mr. Buttery—About 1,000 acres, though you could start a small one with 500 acres. When we have grape-juice houses we can make more money in grape culture than we can now, for they will take care of the crop when prices are low.

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REMARKS BY PROF. W. F. MASSEY

Professor W. F. Massey, of Salisbury, was called upon and made the following remarks:

You know when you build a log house you have to use chinking, and I think I am called upon to put in a little chinking between the addresses. I have not planted a fruit tree in the last five years, but I have not lost my interest in fruits, new and old. I have not kept up with all the advanced practice in fruit culture, as I am giving more time to vegetables. I want to say a few words in regard to the business ethics of the nursery trade as it is often practiced. There are men who will put out all kinds of worthless fruit under the name of good fruits, or sometimes under new names. There are others who put out old and well-known fruits under new names. These men are doing good because they secure the larger planting of these good old fruits, but they are robbing their customers, because they are charging a larger price than they should charge. Both of these practices should be very severely condemned. By the way, I have not heard the Mayflower peach mentioned at this meeting. It is perhaps the earliest peach known, a beautiful peach, red all over. It had its origin in Mississippi thirteen years ago and it was recently advertised by a well-known company as not having missed a crop for eighteen years. This is a pretty broad statement considering the age of the variety. Another company was advertising a new strawberry plant as a very wonderful fall-bearing variety, but this company did not catalogue the Progressive. I knew that they had the Progressive and I wrote them and found that they were selling the well-known Progressive under a new name. You will find a whole lot of this business and I just want to put in a few words to caution you not to be deceived by such things. There are plenty of honest nurserymen and you should not deal with those whose honesty may be questioned.

I am very glad to be here at this meeting and I wish you all great success, not only as a society, but in your individual work.

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THE WORK AND VIEWPOINT OF THE OFFICE OF MARKETS AND RURAL ORGANIZATION

By WELLS A. SHERMAN.

Every bureau and office of our Department is an instrument created by Congress for the accomplishment of certain useful ends. Each exists from year to year at the pleasure of the Congress and is allotted definite sums of money for specific purposes. No office and no investigator is at liberty to anticipate or to exceed the expressed will of the law-making body. We must confine our activities within the bounds set by law which call us into being and the annual appropriation acts by which we are financed. Our Office is sometimes misunderstood and has been accused of being timid or overconservative because we have declined to exceed our authority.

Congress in appropriating funds for the maintenance of the Office of Markets and Rural Organization states that our duties shall be the "collection and distribution of useful information on subjects realting to the marketing and distributing of farm products" in the United States. The work of our Office is, therefore, investigational and not regulatory. Our province is to study the forms of co-operation now in vogue in this country, to study carefully the present methods of marketing, to study the machinery for the distribution of farm products and to note the efficiency or inefficiency of all these agencies. Special provision is made for investigation in cotton marketing, and in rural organization for other than marketing activities.

This study of the methods now in use has been undertaken with an open mind. We have not sought for evidence to support any preconceived notions. We have not presumed to point out all the improvements which should be made in our methods of handling foodstuffs. We have not sought to stamp out abuses, because Congress has not laid this duty upon us, nor given us any weapons for use in such a fight. Rather it has been our object to pursue impartial investigations calculated to discover the reasons for abuses, where any are found to exist, and to learn how these abuses may be stopped. We have not antagonized any legitimate agency engaged in producing or handling the nation's foodstuffs. Rather, we have approached them all in a spirit of helpfulness as fellow-workers in the field of efficiency; and by enlisting their co-operation have managed to secure much valuable information and some concrete results which we believe to be very desirable.

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THE STATE AND THE NATIONAL VIEWPOINTS.

When marketing agencies, commissions, departments, or inspectors are organized or appointed by the several States, they are usually invested with specific powers which are to be used to accomplish definite ends. Some have begun their existence under mandates to bring about certain reforms and to change certain existing conditions. The people of the States look to their marketing agencies for action and may wish such action to be either constructive or destructive. In the exercise of its powers the State's agency must reckon only with public sentiment within the State, and with the interpretation of the laws by the State courts.

On the other hand, our Office has no power or mandate to change or to correct any existing condition. We are to study efficiency wherever we find it, and by description and publication we must promote that which is good in organization and in business method. Having no power to correct any evil or to prosecute, punish, or restrain any wrongdoer, we have believed it the part of wisdom to decline to investigate specific complaints against individuals or firms. Thus by conscientiously observing the limits of our authority we have avoided all contests and recriminations. Nothing could bring our usefulness to a more abrupt termination than the merited antagonism of that indispensable body of men who assemble, transport, store, and distribute the farm and food products of this country.

A FEW WORDS ON THE EVERPRESENT MIDDLEMAN.

There is a very widespread notion that middlemen of all classes are largely useless parasites which could be eliminated by a sweeping reform in marketing methods. The word "middleman" is often used in a very loose sense and, quite often, the user has but a hazy idea of what he means by "middleman." Actually, every person or corporation concerned in the transfer of foodstuffs from the producer to the ultimate consumer is a middleman. Railroads, express companies, truckmen and teamsters, wholesalers, commission men, jobbers and retailers are all middlemen, and there are many others. It is not my intention to discuss the function of each of these. This we have done in one of our publications, which can be had on application. But we believe that each class is in existence solely because it serves a definite economic purpose or renders a service for which someone is willing to pay. Competition alone would make it impossible for the middlemen of any large class to exist unless they did render a useful service. We believe, therefore, that the condemnation of middlemen, as a class, is not justified, and that, for an indefinite future period, many of them will be found indispensable to our civilization.

The general public does not see the items which enter into the difference in price between the farm and the table, and jumps to the conclusion that the difference is chiefly profit, forgetful of the excessive amount of service rendered. The ultimate consumer buys not only produce, but the produce plus the service.

Let us take up for a moment a few prevalent complaints.

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The wholesaler or commission man is generally the object of the severest condemnation from the public in general, and the producer in particular. There are several reasons for this. Probably the most important is the fact that it is from the commission man, or wholesale buyer, that the farmer receives his returns, and when such returns are unsatisfactory he blames the person with whom his direct transactions occurred. Further, the business of handling perishables is not on as stable a basis as is ordinary merchandising.

Prices fluctuate considerably, sometimes fluctuating widely over night. When such sudden drops occur the producer, who is far from the market, is likely to feel that he has been robbed. Finally, the commission business presents such unusual opportunities for dishonest practice that the average man is likely to assume that dishonesty is prevalent. There are doubtless many adventurers among wholesale produce dealers and commission men, and these should be compelled to mend their ways, and promptly, but we should not condemn the commission men as a class, forgetful of the houses which have established national reputations.

THE STUDY OF WASTE.

It must not be inferred from what I have just said that there is no room for improvement in the handling of food products; on the contrary, there is vast need for improvement. But such need exists not with any one class of handlers of foodstuffs, but in every single step along the line. There is a great deal of unnecessary waste which must be eliminated, and there are many inefficient methods which must be improved. Inefficiency in handling goods is just as truly waste as the actual deterioration or decay of the products themselves.

The waste of which I speak begins with the farmer himself. The average manufacturer or merchant expects to make a success only by giving his customer exactly what that customer wants. The average farmer, on the other hand, does not give sufficient attention to supplying the consuming public with what that public wants. Often he is guilty of offering inferior products, improperly prepared, improperly packed, and improperly loaded into cars. Many farmers seem to have the idea that anything will do to ship. Our investigators have frequently met farmers who admitted frankly that they themselves would not eat the products which they were sending to market. The need for proper grading and standardization of perishable products is indeed a crying one. One of the leading features of the work of our Office is that which deals with "Market Grades and Standards." This force is working constantly to secure information which will help to bring about standardization of fruits and vegetables throughout the United States.

Not only does the farmer waste by raising and packing produce that the consumer does not want, but very often much produce is not shipped under proper conditions. Sometimes the shipper is the individual farmer himself, but more often he is a local broker or merchant who buys small lots to make up full cars, or the shipper may be a co-operative organization. Waste is often found in the breaking of packages caused by the careless loading of cars, and in deterioration due to improper ventilation or refrigeration.

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Waste of another kind occurs through lack of common-sense business methods, shippers not having sufficient knowledge of transportation and marketing to handle, control, and release their goods safely or to route them advantageously.

Although wonderful strides have been made in the transportation of perishables during the last twenty years, waste still exists here. Our transportation specialists are actively engaged in assisting railroads to eliminate this waste. They also assist shippers by studies of those problems which concern losses and deterioration in transit.

Our investigators in market business practice are educating the shippers, and especially co-operative organizations, as to proper business and accounting methods. Their field is nation-wide and they are able to bring to the solution of any business problem the experiences of those who have encountered similar difficulties. Hundreds of co-operative grain elevator companies are now using a system of accounting devised by our office. The preliminary work has been done on a model accounting system for commission men and wholesalers, and this system is actually on trial in one of the largest houses in New England.

Although wholesalers as a class are an absolutely esential link in the chain of distribution, they are not all pursuing efficient business methods. We have found many who keep their books in a most haphazard way, and who carry on their operations with little system.

A small force of specialists in co-operative organization are active in assisting growers to solve their problems of co-operation and to conduct their organized purchasing and selling activities efficiently. In certain instances these men have assisted in the actual work of organization, and, in some cases, in promoting federation among a number of local co-operative organizations. Possibly our greatest usefulness in this field will be found in harmonizing producers' organizations which are in destructive and wasteful competition with each other.

The importance of agricultural co-operation is fully recognized in Congress and the discussions brought out at the hearings on our appropriation bills show that the promotion of organized marketing on the part of producers is recognized as one of our most important activities. Although we have listed some 5,000 farmers' co-operative or marketing agencies in this country doing an annual business of over $600,000,000, yet the waste through misdirected individual effort is enormous. Much of it could be saved by the systematized grading and inspection which accompany effective organization. Without some co-ordination of the shipments of a given region or district the producer can not make effective use of accurate market information even when it can be obtained. In short, the average producer is not in a position to be greatly aided by any effort which the Government may make in behalf of better marketing until he has done what he can for himself by establishing such co-operative relationships as may be practicable with his neighbors, whose interests are identical with his own. Never was the need for co-operation more evident than today. Never were conditions more favorable for the success of well-considered movements in this direction. Never before was

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the Department of Agriculture able to furnish such competent advice and guidance to those engaged in the essential, but too often thankless, task of bringing producers together in businesslike co-operative organizations.

Our "City Marketing" investigations have collected valuable data regarding detail methods, but principally with relation to municipal retail markets, and advisory assistance has been given to cities desiring to organize municipal markets, both terminal and retail.

Retailers frequently show marked inefficiency. While many manage their business most creditably there are many more who allow it to run along as best it may, almost without management. As yet we have not been able to give the retailer the attention he deserves, as this involves such an immense number of local studies. Retailing is unquestionably the most complex and difficult feature of the marketing problem.

The last link in the marketing chain is the consumer himself, and the consumer can blame himself to a large extent for the present high cost of foodstuffs. The marketing for the household is often done in a most thoughtless fashion, without apparent regard for economy or efficiency. The consumer is as much in need of education as anyone, and can not expect that present prices will be reduced materially until he is willing to co-operate in reducing waste by doing his purchasing more efficiently.

On the whole, the Office feels that conditions are far from ideal. Improvement is needed in every phase of marketing, and producers, middlemen, and consumers can be assisted materially by educational methods such as I have just outlined. It has been our effort to locate the unquestionable needs for improvement, and where we find particularly efficient or desirable methods in operation we try to give them widespread publicity.

The services of all the specialists which I have mentioned may be had by the particular section or organization most in need of them or offering the most promising field for inquiry, wherever located. The Nation must be our unit when planning certain investigations or considering possible reforms. When we have done local work in any of the States we have been very glad to co-operate as fully as possible with State and local officials, and we are declining to respond to the appeals of local interests unless some State official, or someone representing its agricultural college, assures us of the importance of the problem and indicates readiness to assist in its solution.

SPECIAL CONSTRUCTIVE SERVICES.

In response to calls for assistance from Arkansas one of our investigators in grades and standards, co-operating with State officials, investigated the situation and offered for approval three grades for sweet potatoes which were adopted at a meeting of the growers.

The jumbos or "pie" grade is for strictly southern consumption and includes all potatoes over 3 inches in diameter. The choice or No. 2 bakers are sound stock from 1¾ to 3 inches in diameter and not over 8 inches long, and may contain some crooked potatoes. The prime or No. 1 bakers must all run from 2 to 3 inches in diameter and not over 7 inches in length and must be

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uniform and well shaped. Although these sweet potatoe grades have been introduced in only one district, we feel that this is a start.

Standardization of packages has also been receiving much attention from our grades and standards project. From several hundred factories making fruit and truck packages data have been secured with reference to size, types, specifications, capacities, cost, etc., of the various packages. Our collection of typical containers for testing and demonstrating amounts to nearly 300 different types and sizes.

Some progress has been made in standardizing packages, and we feel that the standardization of package types is quite as important as the standardization of grades.

I will cite one instance of progress made in the standardization of packages. Representatives of our Office were invited to attend the semiannual and annual meetings of the National Basket and Fruit Package Manufacturers' Association, held respectively at Norfolk and Cleveland, whose action was to be taken on national standardization of containers. At the last meeting action was to be taken regarding the standardization of the well-known Climax baskets. Previous to this time there had been manufactured 2-quart, 4-pound, 4-quart, 6-pound, and 8-pound baskets, as well as 18 and 20 pound jumbo baskets. Before attending this meeting representatives of our Office carefully measured the dimensions and contents of numerous Climax baskets which were submitted to them. Of jumbo baskets twenty kinds were submitted, varying in measurement of bottom from 5⅞ to 7 inches in width and from 15 1-16 to 17 inches in length, and showing a variation of 2 quarts in cubic contents. Of the 4-quart or 8-pound baskets, supposed to be practically identical, 33 different kinds were submitted, which varied in actual cubic contents from 3½ quarts, 30 cubic inches, to 5½ quarts, 25 cubic inches, with all possible variations between. Of ponies, or 4-pound baskets, 14 different kinds were submitted showing a proportionately wide variation.

The report we submitted to the basket manufacturers as a result of these investigations was a great surprise to them and finally resulted in the adoption of three standard Climax baskets, the 2-quart Pony, the 4-quart basket, and the 12-quart Jumbo, and careful specifications were laid down for each size.

Hereafter when you make a purchase of fruit in Climax baskets you may expect to actually get 4 quarts in a 4-quart basket and not a quart more or a quart less.

Under that branch of our work known as "Market Surveys, Methods and Costs," for which I am immediately responsible, we have been making a series of investigations which I have not touched upon heretofore, which we feel are very important, dealing with the interrelation of the various sections of the United States producing similar commodities, the extent to which they compete with one another, and what the logical market for each may be. The question of the efficient and equitable distribution of foodstuffs, especially perishable fruits and vegetables, is of supreme importance and affects the profits of all who own or handle them. We have been making a careful study of this problem of distribution and have already published several

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bulletins bearing on certain phases of it, while several more are now being compiled. This work can be done effectively only with the cordial co-operation of the common carriers, as they have the only records of the quantities moved from any given area.

We can not emphasize too strongly the far-reaching opportunity for usefulness which now opens before us since the railroads have shown a willingness to give us practically any information we may require concerning their business. The fact that the railroads and boat lines assume this attitude toward our work places us in a unique position. It enables us to proceed confidently to the task of organizing a comprehensive information service for fruits and vegetables, a service involving the prompt report by telegraph of all carload movements of specific products with their destinations. At the market end they stand ready to give us their daily record of cars unloaded, with their point of origin.

We have ample authority to put our men in every city and in every important producing section to collect and distribute price and shipping information. Here we have the outline of a news agency, the possibilities of which appeal to the imagination. What may we not hope to accomplish in the direction of better distribution when shippers have learned to use the comprehensive information which will daily be at their command?

We need not be confined to a discussion of our hopes. The preliminary experiments have been tried and definite results obtained. During the past season we covered in succession strawberries, tomatoes, cantaloupes, peaches, and for a short time Northwestern pears. Every morning telegraphic night letters from all the roads originating these commodities gave us the movement of the previous day. Rewiring the summary of these reports to our men stationed in the larger markets we enabled them to give the trade and the press information on these crops which was more comprehensive than had ever been available. The trade in turn gave us the most accurate insight into prices, qualities, and the tone of the market. Railroads invariably gave our market men a record of daily arrivals, so that prices could be interpreted in the light of both receipts and shipments. All of this market news was available to the shippers, and in regions of heavy production, where we were able to place one of our men to distribute and interpret this news to the growers, shippers, and local buyers, its commercial value was promptly demonstrated.

This is not the place to discuss in detail the difficulties we have met nor those known to lie before us. Audiences become impatient when public servants dilate upon their difficulties. Suffice it to say that no organization or service of this sort, however well conceived in the Office, has ever been brought forth at once complete, symmetrical, and working smoothly in all its details. For many phases of this work it is impossible to secure experienced men. The work is new and the men must be developed with it. We will have experienced men as soon as there are any, for they will be a by-product of the enterprise itself.

I invite the attention of the farmers present to the estimates of the Secretary of Agriculture now before Congress. For the work of our entire

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Office a total of over $300,000 is asked. This includes an item of $136,000 for the development of the news work I have just outlined. Should this item be approved we expect to increase our list of products covered by the telegraphic service to a dozen or more. Among these will be some of great importance in your States. It is too early to make a definite list, but we should hope to be of specific and timely service to the peach, grape, cabbage, and celery growers, while we would expect by a continuous mail service to keep a finger on the pulse of the apple, potato, and onion movements.

There is another item in the estimates for the next year which, though much smaller, may prove to be of equally far-reaching interest. It is not a part of the estimate for our Office, but is to enable the Secretary of Agriculture to co-operate with the several States in the employment of marketing agents. Three such co-operative arrangements are already in effect, financed by funds from our present projects, and it is believed that as the several States provide funds for this purpose we can build up a force which, while serving the States separately, will be knit together through our agency. We could bring such a force together in annual council in Washington and through them carry to the producers of every State any idea worthy of wide adoption or any method of work or form of service capable of wide application.

I have not even mentioned our work in the fields of live stock and meat marketing, dairy marketing, grain and hay marketing, and direct marketing through the parcel post and by express, nor have I touched upon the great field of activity which has been opened to us in connection with various phases of the cotton industry. The only regulatory powers we exercise are in connection with enforcement of the United States cotton futures Act. Should the pending Warehouse Bill and Cotton Standards Bill become laws, the Department's responsibilities will be largely increased.

REFORMS DEMANDED.

This brings us to the consideration of a number of reforms and new services in which there is such a growing interest as to warrant the belief that the people will soon ask for legislation which will authorize someone to put these reforms and services into effect.

The files of our Office indicate that many shippers have found themselves unable to secure justice from persons or firms with whom they have attempted to do business at long range. A demand seems to be growing for the exercise of some form of Federal control over those who do an interstate business in farm products. It is especially desired that some disinterested Federal agency be given powers of inspection comparable to those lodged in our national bank examiners, to the end that the shipper may be officially informed as to the soundness and reliability of the firms to which he consigns his property, and may even secure an official report on the disposition of his particular shipment by paying a reasonable fee for the service.

But this is not all. Claims are frequently made that perishables have arrived on the market in bad order, while goods bought subject to inspection too often are rejected on arrival. Southern shippers are especially insistent

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that some disinterested physical inspection of their products shall be made available to them in the Northern markets. It seems unlikely that anything less than a service under Federal control will inspire confidence. It is not to be expected that the Florida shipper will believe that inspectors in Boston, New York, or Philadelphia, who are under local control, will be as loyal to his interests as to those of the business men with whom they are in daily contact.

Again it may truly be said that it is impossible for the law of supply and demand to regulate the price of any article if the public is uninformed as to the actual supply of that article. In these days many products are stored in quantity and held over long periods. In most cases there are sound economic reasons for this practice. But if the large supplies are put away and the public is denied accurate knowledge of their volume, there is no sound basis on which prices may be determined. Conditions result which are favorable to speculation and manipulation and which militate against sound business. The public is awakening to this situation and beginning to demand that the facts concerning stored food supplies be officially ascertained and made known. We have made a beginning through reports of apples held in cold storage, voluntarily given, but these reports are not complete. Many storages are averse to giving any information as to their holdings of apples, and the difficulties encountered when we attempt to inquire into the holdings of other foodstuffs, such as eggs, meats, and packing-house products are far greater than in the case of apples. The economic resources of the nation can never be utilized to the best advantage, nor with the greatest good to the greatest number until the volume, location, and ownership of these resources are matters of public knowledge.

There is a fourth reform for which the middleman himself cries aloud. He has at least one well-founded grievance. His problem would be immensely simplified if he could handle graded and standardized products exclusively. He would be willing to see Congress invoke the constitutional power to establish uniform weights and measures in order to compel some sort of uniformity in the packages used and in the grading of the produce in which he deals. There is probably no reform by which the producers themselves have more to gain, but the difficulty of bringing about the desired uniformity by voluntary or State action alone is well-nigh insurmountable. It follows that power must be lodged in someone to establish practical market grades and standards for the great bulk of our food products moving in interstate trade. Packages and packing must be standardized as well as the products themselves. The task will be truly Herculean, but it certainly can be done. It can be done without depriving any community or any product of its market. When it is done we can have an inspection and certification at both the shipping point and the market which will mean something, because a common language and a common standard will apply to the same product wherever it may be shipped.

Our Office was peculiarly fortunate in that it was not burdened at the start with police or regulatory powers, nor given a mandate to initiate such reforms and services as those just enumerated. Our investigators have had nothing to conceal or to enforce and in consequence comparatively little information which we have requested has been refused. We have thus had an exceptional

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opportunity to determine the facts and to form unprejudiced opinions on all these subjects of possible legislation and we would be unworthy of the trust which Congress has placed in us if we neglected to develop a viewpoint and to build up the nucleus of a force which will make us useful instruments in the hands of Congress whenever the people determine that the time has come for the inauguration of any of these services or reforms.

May I close this paper with a direct appeal to you for the greatest assistance which it is possible for anyone to render our Office? We are young, We are growing—growing so rapidly that our greatest danger is that we may not be able to digest the new material as rapidly as we must take it in. We need men, young men, clean characters, strong personalities. Men with open minds, willing to learn. Men who can write what they learn in creditable English, so that our publications will be read and will be worthy of preservation. For certain positions we must require some preliminary experience. For our scientific assistants we expect to take young men fresh from college or with little experience. All our recruits must come through the examinations held by the United States Civil Service Commission, and we would not have it otherwise. We look the eligibles over critically before selection. We want the best. We need them. We believe the public needs them and needs them in our organization. We need men who are constructive, who can develop both ideas and leadership, who love hard work, and above all men who can be trusted with the business secrets of those who now confide them to us, or of those whose business it may be our duty to examine in the future. urge such men to take the regular and special examinations held for our Office. Would you send us a candidate lacking nothing? Then let him add to all that I have indicated a true missionary spirit—a willingness to serve the people constructively and contentedly for a salary far below that which he could earn in successful private life. I am emboldened to ask for your best, for we now have exactly such as I have described, and your State is already represented.

Gentlemen, I thank you.

Mr. W. I. Walker—In what way will the information that you get on these postal cards be of service to shippers?

Mr. Sherman—In the first place, it will be of use to us in helping us to check up shipments and get fuller information. At best we were 10 per cent shy in our knowledge of the actual shipments made last year. In some cases people neglected to make reports. We hope to get very much fuller reports and so secure a more accurate knowledge that will be of use in the future, if not of immediate use, in the shipment of such perishable products as peaches. We can make it of use to potato shippers by telling them of the shipments of the past days or past week, and of the previous year, and by comparison they can judge of prices, and we can give day by day a record that will indicate the volume of the crop and its distribution.

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REPORT ON NEW SMALL FRUITS

W. F. ALLEN,
Salisbury, Md.

In discussing new small fruits I will start with the most prominent, the strawberry. Big Joe should be mentioned, although it is not new, as it was put on the market ten or fifteen years ago by John H. Black, of New Jersey, but it is new to many people and it is known under different names. Quite a number of men have claimed to be the originator. It is sometimes called Joe Johnson. It has done well on the Peninsula. The growers south of me have been growing considerable quantities of it and have got good prices and are very much pleased. It has rich, handsome berries and everybody who has seen it wants plants. It is a fairly good carrier.

The Chesapeake is not exactly new, but too important to overlook. I consider myself fortunate in being the introducer of this berry. I got hold of it by offering prizes of $100 in gold and was well repaid. After fruiting it I bought the entire stock. I put it on the market and it has become quite popular. It is doing well all through the country, south as well as north. I took a trip out West this fall and found it in the State of Washington, where it is one of the best four berries grown in that State. It is giving satisfaction everywhere. I hear some complaints from nurserymen because it does not make many plants, but not from growers. It makes plants enough for a good crop of fruit. It is one of the largest planted varieties on the market today. It comes in two days ahead of Gandy and continues about the same length of time. It will give better results on sandy soil than Gandy will. It is a good shipper and high quality.

The Early Jersey Giant was originated by Dr. Walter VanFleet, of New Jersey. I am very favorably impressed with it. It is not the earliest, but is one of the largest and best of the early varieties. It is not quite as large as Gandy and Chesapeake, but it has a very attractive color, strong grower, and a heavy yielder, the foliage free from rust, and it makes plenty of plants.

Early Woodow I have not fruited, but saw it on the owner's grounds last year, and immediately procured plants and started to grow it. Our plants made good growth. It is very red in color, rich and glossy as though it had been varnished. Large size and exceptionally firm. If this berry can be grown in large quantities and if the fruit is like that which I saw last summer, I am sure it will make a market berry.

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Edmund Wilson is one of the VanFleet seedlings, is a late variety, fair quality, one of the most vigorous plants I have ever seen, but I am not very enthusiastic about it. It had some large, fine berries, but it was not productive, and it is too dark for the average market, and not very good in quality.

Gold Dollar is one of the best of the early varieties for market. It is a question with me whether Gold Dollar or Early Ozark is the better grower. There is not a great deal of difference between them. The Gold Dollar produces a heavy crop of large-sized, highly colored berries that are perfect in shape.

The Hustler is a new variety which I got last year. The first time I saw it I was very much impressed with it. It is a native of Pennsylvania and the berries are certainly beautiful. On one occasion Mr. McKay, superintendent of the Reading Terminal Market, got three quarts of each of a number of different varieties, and when he showed them to the men in the market all but one of the fifteen selected the Hustler as the best. The plants are very strong and vigorous, good foliage, berry of large size, high quality, and of a beautiful, rich scarlet color. Firm enough to ship and is very promising.

I do not know that the James E. has ever been fruited here. I saw it in eastern Virginia a few years ago, where it was making a good growth, but insects seemed to like it better than any other variety. As I saw it in Virginia it makes an excellent growth, ripens early, and is moderately firm, and is promising for nearby markets.

LaBon is a new variety from Michigan and is claimed by the originator to be of high quality and large size.

Lady Corneille comes from the South and is highly recommended, better than Klondyke, it is claimed. I saw these fruited in southern California and it is one of the finest in that section, and was bearing as late as the middle of October.

The Late Jersey Giant is another VanFleet seedling. It is a question whether it is productive enough to be profitable. For amateurs who want large size and uniform berries it is worth trial. It is very large, like a medium-sized tomato, fifteen or twenty to a quart, and it must be handled very carefully.

The McAlpin originated in New Jersey in sight of the McAlpin Hotel, and is named in honor of that hotel. It is a very strong growing variety, growing almost as fast as Senator Dunlap, and is one of the most vigorous growers we had on the place. It produces large fruit and very firm. There are so many worthless varieties on the market that we often go to the city to see how they look, and we found the McAlpin selling in New York side by side with the Chesapeake and giving excellent results, selling from 20 cents to 25 cents a quart wholesale. The color is very attractive, a cardinal red. We fruited this variety the past season for the first time and we thought for

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a while that it was going back on us, but it matured a surprisingly large crop and I think very well of it.

The Premier was put on the market from Michigan. It has been highly lauded and highly advertised. We have some growing and they have made a fair growth. The foliage is light-green and spreads completely over the fruit, so the introducer states. I have not fruited it.

The Rewastico is a comparatively new variety that originated in Wicomico County. It is a strong, vigorous grower, very productive and very firm. It has been marketed mainly in Baltimore until the past season, and I am told by several that their shipments were followed by letters asking for more of that variety. The past season we shipped some to Boston and got excellent reports from them.

Sweetheart was recently sent out from Rochester, N. Y. It has a habit of producing pale-yellow, sick-looking leaves. Does not hurt it very much. The quality is fair, good berries of large size, but too soft for market and will be a poor shipper.

The Twilley originated in Virginia by Rev. J. W. Twilley. It is a very healthy growing variety, has a peculiarity in the folioge, turning red in the fall. It is more showy in appearance than any variety I have seen. It is very attractive, very firm, and is an excellent variety for market purposes.

The Warren is a new variety originated by Samuel H. Warren, of Auburndale, Mass. It was sent out last spring for the first time. Mr. Warren has been growing berries for fifty years and he regards this as his very best berry. Two years ago I saw some of these berries on the Boston market and they were as fine as I ever looked at. This variety was put in my hands by Mr. Warren last year so that the public could have them.

The Willard is a new variety sent out last year with high claims. It made excellent growth, but we have not fruited this variety yet. I feel sure that one of the parents is the old Nick Ohmer, as there is no practical difference between the leaves of this and Nick Ohmer.

The York was introduced this year from York, Pa. The berries are long, pointed in shape, medium size, and high quality.

I must not overlook the fall-bearing varieties. We have three or four that have been successful. The Standpat is well named in one way, for if you set out a plant it stands right there and does not make any runners. It is too hard to grow to be worth while. The Americus is hard to grow, although I have seen it make good beds. The fruit is firm, very high color, and would be very desirable if you could get more of them. It is true of this variety, as of all fall-bearing varieties, that they withstand early frost and keep on making fruit after other varieties would be killed. Superb was introduced by Mr. Samuel Cooper, of New York. It is a good healthy grower and produces a fair crop of berries in the fall. It produces a spring crop. But the

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best of all the fall-bearing varieties is the Progressive, and you will make no mistake if you plant this variety. It is a good growing variety and makes good beds. It will start bearing in the fall as soon as the season opens and keep on continuously until frost cuts it off. We would not grow this for a spring berry. You get the best crop the year you plant it. We had 1,000 letters about fall-bearing strawberries, all asking if you could get a crop the same year you planted them. If you want to use the berries the first of August, I would advise keeping the blossoms off until about thirty days before you want fruit. You would not get a good spring crop, but would get a good crop for the fall. I have never seen a better variety than the Progressive and if you follow instructions you will have berries late in the fall. You can not get as many at one picking as you would get in the spring, but they bear continuously all the time from the first of August until heavy frost. I counted one hundred blossoms one day in October on a single plant. A great many people are skeptical about the value of fall-bearing varieties, but they are worth while. The quality of the Progressive is fine.

Professor McCue—Does the Progressive bear its best crop the first year?

Mr. Allen—Yes. It is difficult to keep the blossoms picked off the second spring, and if allowed to bear in the spring it does not bear in the fall.

Mr. Killen—I have found the Progressive practically worthless the second year. It is too much trouble to keep the bed thinned out the second spring.

Mr. Lippincott—Is the Progressive as large as the Superb?

Mr. Allen—No; it is about as large as the old Dunlap.

Mr. Otto Sanger—How far apart should the plants be set?

Mr. Allen—They are set the same distance apart as other. Two years ago I had an acre near my house planted early in the spring, and by the middle of August we had beds 15 inches wide. We picked them the same as in the spring and got a hundred quarts three times a week. I have seen ripe berries on a new plant before it had taken root.

Of other small fruits I might mention the Atlantic dewberry, that has been offered under two or three different names. It is a very late variety. I ran across it in southern New Jersey, where it was making a great show. I bought $500 worth of plants on the spot, but it is not as good as I thought it was. It seemed fine where it was being grown on low, black land, such as most of our people recommend for growing strawberries. It was not satisfactory in Salisbury. The fruit is not large enough and is too seedy. The Nanticoke blackberry comes at the same season and is better and we get rather more for it than we do for the dewberry.

The Joy blackberry was originated in New Jersey by Jacob Miehl. It is a fairly good blackberry, but not free from rust, as has been claimed; very few verieties are. We like the Watt better, which with us the past season was the finest blackberry grown. The past season was the first time I fruited it to any extent. It is a fine grower and immensely productive.

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I found the Nanticoke in Wicomico County. It is said to have come there from Norway. Whether this is true or not I can not say. It is a very strong grower and the latest of all blackberries that I know. It ripens through August near Salisbury, and sometimes runs through into September.

The McDonald, from Texas, is a cross of the blackberry and the dewberry and is partly trailing the first year. It is a firm, good shipper. It is a pistilate variety and will have to be planted with some other variety that will pollinate it. It is very early.

The Leader is a new variety from Illinois and is a good grower. It comes highly recommended.

Of raspberries the Black Pearl is a western variety that I fruited the first time the past season. It is very black, without bloom; very productive, and large size.

The Scarff, named for W. N. Scarff, of Ohio, is a new variety from the man from which it takes its name. It is very vigorous and a large, strong grower and very productive.

The June, sent out by the New York, Geneva, Experiment Station, is slow growing and not very attractive. I have fruited it in a small way. The New York Station claims that it has a great future. It is very early and large size.

I am not quite sure where the Perfection originated, but one of the finest fields I have seen was on the Hudson River. You can pick three or four quarts to the hill for the season. It was being shipped to New York and was bringing 50 per cent more than other varieties at the same time. It has not been fruited here to any extent.

The Sunbeam is a new Western variety of good quality. Dark-green foliage.

Judging from one season, the Ohta, from Minnesota, has proved to be the best red raspberry we have ever grown. It is early, a strong, healthy grower, a brilliant cardinal red color that is attractive, and it is of fine quality. This is my experience of one season of this variety. I have planted all I can get.

The St. Regis is a New Jersey production, brought there by some Italians. It is being largely grown over the country and is giving better results in the South than any other variety. A hot climate is not adapted to red raspberries. It is not in the least affected by its fall-bearing qualities. Along in August it commences to set fruit on the young canes and bears continuously. Many growers in New Jersey have averaged $400 an acre from this variety. It does not bear as many in the fall as in the spring, but it is the best fall-bearing variety.

Professor McCue—Is the Black Pearl subject to anthracnose?

Mr. Allen—I can not say to what degree, but my impression is that all varieties are to some extent.

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WHITE POTATOES

E. H. SHALLCROSS.
McDonough, Del.

The 1915 season has been a very peculiar one for potato growers. From reports the usual acreage was planted, with probably an increased acreage in Virginia. The early crop was the largest in years and prices were the lowest in years. Lots of carloads did not bring freights, and railroad companies required freight to be paid in advance or guaranteed before they would move the car. In some sections of Virginia, Maryland, and New Jersey the crop was not harvested, but allowed to rot in the field. In other sections a furrow was plowed upon the row and potatoes dug just before frost. I am speaking of early potatoes. The crop reports and general opinion seemed to indicate that it was impossible, with the large early crop and prospects for a heavy late crop, for prices to ever get to a paying point, so the general impression was for everybody to sell at once, take their losses, and forget about it. Some northern growers from this point of view became discouraged after the crop was planted and did not take the usual care and precautions in spraying. The result was that the late blight injured the crop from 30 to 50 per cent.

After the early potatoes were out of the market and the late crop began to come in, with practically a half crop, the potato situation took on an entirely different aspect, so today potatoes are selling from $1.10 to $1.25 per bushel, with indications that they will go much higher. Another point that has helped the price of potatoes is the increased consumption of them, due to our manufacturers being very busy in all lines, so the working people of the country have more money and consequently they buy more of everything, including potatoes.

The potato situation is one that requires considerable thought for the coming season. Seed potatoes are going to be high—$2 per bushel may be the price for early seed—and the present European war is making the American farmer's fertilizer problem very complex. Potash is at a prohibitive price for fertilizers, prices ranging from $450 to $500 per ton, as compared with $48 per ton in time of peace. Nitrate of soda is quoted at $65 to $70 per ton, as compared with $50. Acid phosphate is quoted at $17 to $18 per ton, as compared with $11 and $12. Potash can not be imported at this time and the others affected are used in the manufacture of munitions, which is sending the prices up. The probable fertilizer for potatoes for the coming year will

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contain 3 to 4 per cent of ammonia and 7 to 8 per cent of phosphoric acid, and in most cases no potash at all. We undoubtedly have sufficient potash in the soil in this section of the country to grow several crops of potatoes by careful and thorough cultivation. Because of the shortage of potash last year we used a fertilizer containing 4 per cent of ammonia, 8 per cent phosphoric acid, and 2 per cent of potash, and we had large crops, better than for years when we were using 10 per cent potash. We shall not hesitate to go on trying to grow potatoes without any potash until the price is down to something like normal. No doubt some of the potash that we have used in past years is still available in the soil, and with the amount naturally in the soil we think that we will have enough so long as we use stable manure and give thorough cultivation. We should cultivate twice as much as we have been doing and this will make more potash available.

Question—What about using undissolved rock or floats?

Mr. Shallcross—I am not sure about the use of floats except around stables or pounds, for it takes it a long time to become available. Still I think we should resort to something rather than pay $18 or $20 per ton for acid phosphate.

Professor Temple—The price of potatoes is such an interesting thing that we should not pass it over. It seems to me that we have never had better indications of higher prices for potatoes than we have this year. The European war has been an important factor in bringing about these conditions. Added to this, the acreage of potatoes was cut down, owing to the fact that wheat was planted where formerly potatoes were. I predicted last spring that potatoes would be as high this winter as they had been in many years, and they will continue to go up until the new potato crop comes on the market. If you can grow potatoes this spring and get them on the market early, you can make enough to pay for your land this year. If I were a potato grower, I would put all my force in the early potato crop.

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THE USE OF FERTILIZERS

ROBERT SYMONS,
Easton, Md.

I wish to congratulate the Peninsula Horticultural Society on the display of fruit made here this year. This class of fruit con not be produced without great care, trouble, and expense. It is a display that would be a credit anywhere. I am glad this Peninsula is coming to the front in fruit growing, and I hope that it will come to the front in producing every crop. The gentlemen who can produce apples know all about fertilizers and what it takes to grow these fruits, so I feel somewhat bashful in expressing any ideas to you, but I will give a little of my experience. The fertilizer question is a large question, a question that faces every farmer in Maryland. Commercial fertilizer is the greatest money grabber of the whole country. There are more notes in the bank given for fertilizers than for anything else. We have got to go back to some of the old-time methods. We should till no more land than we can cover with manure or green manure, and use commercial fertilizer as a supplement to our home sources of supply. How did the old farmers used to do? This time of the year they would be out in the woods taking up the leaves and the mold and hauling them into the pound to soak up the liquid manures, and in the spring they would haul it out to the land. Do farmers do it today? Very few. They take their automobiles rather than go into the woods. An auto cuts two horses out of every farm and the production of manure is lessened. The fertilizer business of today is a big business. The report says that this country used in 1913–14 $125,280,000 of commercial fertilizer. Don't you think that a lot of that was unnecessary? It is handy to put on the land, but can not we use other things? If you always have a sod you will have humus every time you plow; you can keep on tilling and keep on getting crops. We have grown corn on the same ground for twenty-one years in succession by using crimson clover, starting the clover every fall. The land has only had two sprinklings of manure in all that time, a little henhouse manure and kainit. I would like to impress on the farmers not to put so much in fertilizer, but more in green crops and tillage. Put your land in clover and pasture it with stock, and put in corn only the number of acres that you can manure so as to get good crops. Everybody knows that the stock business pays; the cow business pays. A young man of today can not do better than go into the dairy business, or cattle business, and that will improve his land. We should grow good crops, but not try to force our land too much by fertilizers. I have

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crimson clover that I am pasturing this winter to keep it down; have grown the clover every year for twenty years. My experience with lime has not been favorable and so I do not use it. I would use bone and potash to supplement home sources of manure. Bone is the natural fertilizer for the earth; so are wood ashes. We have got to go back to old nature and stop using so much of these fertilizers. We do not know what is in them. The manufacturer does, and he is a rich man. I was the first to introduce crimson clover in this county. When I bought the place close to town people said, "Mr. Symons you can't grow anything on that land, it has been tilled out." I said that I would try. By using crimson clover I have made it a fertile place. I have grown crimson clover seed at a profit. I grow my own seed and always get a stand. It is very easy to get a good stand in field corn or sweet corn. There are soils that need lime, but I have not considered the soils that need it. Give me stable manure and clover and you may have your fertilizers. Take care of your barnyard manure and use green crops to plow down. Till the soil so as to keep it moist and let the air in and do not let it be idle. There is no use in this world for anything idle. An idle person is of no use. It is against nature. Nature is a forward movement. The sun rises every morning and goes down every night and it is wonderful how things are created and how we live and do as we do. I hope that the conditions of today that confront the American farmer will have a tendency to improve his habits and make him use cheaper things than fertilizers to produce his crops. He has got to come to it. We can't pay $25 per ton for fertilizers. Farming is a speculation. Today's crops look fine, tomorrow a hailstorm comes up and cuts down the wheat. We put hogs in to eat the fallen wheat and hog cholera comes along and kills the hogs. A man has to run a risk in any business he undertakes. If he has cows, he may have the foot-and-mouth disease, his hogs have cholera, his sheep have scab, and he has to run a risk in living. The American Government is often called upon to fill up the deficiency for the farmer. In California they are taking up kelp to get potash for this country. We have got all the fertilizer we want right here in Talbot County, if we will only go and get it—creeks and rivers with black mud full of nitrogen and other plant food. If an enterprising manufacturer was to start, he could make a cheap fertilizer and get one that would do us some good and stay by us. We want something that will last over for more than one year. I do not know what the analysis of this mut would be, but it is valuable.

Professor Pailthorp—I have tried lime in various forms on different soil types on tomatoes and saw no results. On sweet potatoes we have only tried one experiment and we found out that our yields have never been better, but it is sometimes cut down by the use of lime. You can not grow alfalfa without liming the land.

Mr. J. H. Lippincott—I used coarse, partly burned oyster shell lime on strawberries and had the largest crop that I ever grew. In regard to alfalfa, I have grown it for fifteen years and had no trouble to get a stand. It is a most excellent crop to use and to improve land. What you want is nitrogen to grow your crops, and the alfalfa gives it to you.

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Mr. J. L. Twinning—My farm in Somerset County has a lot of sour land, and you can put on barnyard manure alone and will not get the best results, but lime helps, and I find oyster shell lime very profitable. You can not get clover on very sour land, and clover and similar crops are necessary if our farming is to be profitable.

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REPORT OF DELEGATES

President Soper—Our Society has been sending fraternal delegates to the New Jersey Society meeting for some years, although we failed one or two years to have a delegate there. One of our representatives last fall was Professor McCue and we should be glad to hear from him.

Professor McCue—The New Jersey Horticultural Society meeting last fall was held at Freehold November 30 and December 1 and 2, and it was well attended. Not being acquainted with the New Jersey people, I could not tell whether it was a local attendance or if they came from outside Freehold. When I think of the attendance we have here tonight the comparison is not favorable to us. I was not present at every session, but the addresses I did hear were all good. Col. John G. Townsend, of Delaware, made a very fine presentation of strawberry culture. Some of the things that appealed to me may be interesting to you. One of them was a remedy for the strawberry weevil, and this was brought forward by the New Jersey Station; a mixture of sulphur and arsenate of lead, put on as a dust spray. There were also some reports on other plant diseases in the State, and altogether the meeting was an especially enlightening one and I gained a great deal from it. I think everyone there did also. We were received by the New Jersey people in the most cordial manner. I feel we will fall short from giving them as much as we received from New Jersey. I am sure the delegates of this Society will be welcomed to the New Jersey Society whenever we send them. This was the second time I had attended, once at Trenton a few years ago. I was struck with the enthusiasm that the New Jersey horticulturist has for his business. He feels that he grows the best fruit in the world. As long as he does not crowd the Philadelphia market we will agree with him. We have a delegate from New Jersey with us tonight and we wish to have more.

President Soper—We have another of our delegates to New Jersey present with us.

Mr. F. M. Soper—This was my first visit to the New Jersey Society and I hope to meet those farmers and their wives again. The attendance was large, the hall crowded, and I am ashamed when I look over this room and think what a small attendance we have from this beautiful Peninsula. The New Jersey men and women come out to the meetings. It did me good to see that large audience of farmers, fruit growers, and their wives. We are having a small attendance and our people are missing the good things of this meeting. We were received with open arms by our New Jersey brothers and sisters. Their exhibit was fine and showed just what they could do. We can do the

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same and have got to get out and do better than we have been doing and are doing. I enjoyed the trip, we learned a good deal, at least I did, and I hope that we will return again. I hope that our people will bring the young folks out and help us try to make this beautiful Peninsula better than it is.

President Soper—We should be glad to hear from our delegate from the New Jersey Society, Mr. J. Howard Lippincott.

Mr. Lippincott—We have sent one lone delegate to represent the little State of New Jersey. It makes me feel a little proud when I hear that your delegates not only enjoyed themselves, but that they approve our methods. We are making a great effort to help the horticulturists of our State so that they can be looked up to. We are making an effort to have a good show, trying to make it as good as possible. We are training our young sons and sending them to the agricultural colleges, and they are coming back and buying the best farms in the State and are not ashamed to let people see their methods. We are proud of our young people. The section from which I come is going to improve because we have many educated young men on our farms. This is the third time I have attended your sessions and I have enjoyed them immensely. I came as a spy this time and they told me to keep my eyes open and learn everything I can from you.

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JAMES S. HARRIS.

James S. Harris, who died at his home in Still Pond October 7, 1914, was born in Delaware October 3, 1838. While James S. was yet an infant his father, Richard H. Harris, removed to Kent County, Md., where he became a successful farmer. After the subject of this sketch finished his schooling he spent a couple of years in California. On his return to Kent County he devoted his attention to farming, but more particularly to horticulture, his father having had success as a pioneer in the peach industry. He planted, cared for, and marketed the fruit from 50,000 peach trees, 20,000 pear trees, and 7,000 apple trees, and was one of the first to grow the Kieffer pear for market. At the time of his death he had 1,000 acres in cultivation, with fruit as the chief crop. He was a charter member of the Peninsula Horticultural Society and was twice its president; also a charter member of the Maryland Horticultural Society, of which he was president four times. He was an energetic worker in behalf of legislation for the benefit and extension of our vast horticultural interests. He served his county in the Legislature two terms, also as chief judge of the Orphans' Court and member of the School Board. He took an interest in all public matters and was a director of the Chestertown Bank at the time of his death. He was a man of strict, honest, and lofty character and always could well be termed "a friend of man."

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JOHN JAMES ROSA.

John James Rosa was born at Hurley, Ulster County, N. Y., in 1833, and at an early age moved to Owasco, Cayuga County. In 1871 he bought the present home near Milford, Delaware. He went into the fruit business almost immediately, setting out 65 acres in peaches and 25 acres in Bartlett pears, seeming to know intuitively what would be paying crops. A large acreage of strawberries and small fruits at this time was a source of revenue, berries then bringing 25 cents per basket. He was very successful as a pioneer evaporator of peaches, apples, pears, and small fruits. He left young, flourishing orchards of peaches, apples, and nuts at his death, December 25, 1915. Always a working member of the Presbyterian Church, Milford Grange, and influential in the community in which he lived, Mr. Rosa served a term as president of the Peninsula Horticultural Society and was always ready to give of his store of knowledge and experience in horticulture as in other matters for the benefit of his fellow-men. The Peninsula owes much to his long and useful life.

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COMMITTEES.

President Soper appointed the following committees to report at the annual meeting in Dover, Delaware, January 9–11, 1917:

Apples—A. W. Slaymaker, W. E. Sanger, Herbert C. Richardson.

Peaches—O. A. Newton, Benjamin F. Rash, I. T. Cooper.

Pears—Walter B. Harris, J. M. Reed, W. R. Ballard.

Nut Culture—J. W. Killen, Pennell Emerson, J. Frank Biggs.

Grapes—W. T. Massey, Rev. Alfred Smith, Professor Borill.

Small Fruits—W. F. Allen, Dr. F. P. Herr, J. W. Taylor.

Market Gardening—E. R. Anthony, Reuben Brown, G. J. Meredith.

White Potatoes—Frank E. Matthews, J. F. Dukes, James Friedel.

Sweet Potatoes—E. F. Lecates, W. Irving Walker, J. W. Killen.

Fungus Diseases—Prof. T. F. Manns, Prof. J. B. S. Norton.

Injurious Insects—Prof. E. N. Cory, F. C. Bancroft, Orlando Harrison.

New Fruits—E. H. Shallcross, D. S. Collins, Prof. W. F. Massey.

Fertilizers—M. O. Pence, Harry P. Skipper, P. L. Cannon.

Horticultural Education—Prof. C. A. McCue, Prof. T. B. Symons.

Floriculture—Mrs. S. H. Derby, Mrs. W. I. Walker, Mrs. F. C. Bancroft.

Transportation—W. Irving Walker, Charles Barker, Orlando Harrison, W. F. Allen, S. H. Derby.

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VOL. 6. No. 3.

THE BULLETIN OF THE STATE BOARD OF AGRICULTURE, DOVER, DELAWARE, FOR THE QUARTER ENDING MARCH 31, 1917.

TRANSACTIONS

...of the...

PENINSULA HORTICULTURAL SOCIETY

1917

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TRANSACTIONS

OF THE

THIRTIETH ANNUAL MEETING

OF THE

PENINSULA HORTICULTURAL SOCIETY

HELD IN

DOVER, DELAWARE,

JANUARY 9, 10, and 11, 1917.

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OFFICERS FOR 1917.

President,

SAMUEL L. BYRN, Cambridge, Maryland.

First Vice-President,

WARREN C. NEWTON, Bridgeville, Delaware.

Secretary-Treasurer,

WESLEY WEBB, Dover, Delaware.

Vice-Presidents for the Several Counties.

Delaware:

New Castle—A. W. Armstrong, Hockessin.
Kent—A. W. Slaymaker, Wyoming.
Sussex—A. O. Baker, Bridgeville.

Maryland:

Cecil—Charles B. Warburton, Elkton.
Kent—Walter B. Harris, Worton.
Queen Anne—W. Irving Walker, Chestertown.
Caroline—J. S. Lapham, Goldsboro.
Talbot—Gen. Joseph B. Seth, Easton.
Dorchester—Fred. Hirst, Cambridge.
Wicomico—Fulton W. Allen, Salisbury.
Worcester—G. Hale Harrison, Berlin.
Somerset—Frank E. Matthews, Pocomoke.

Virginia:

Accomac—A. J. McMath, Onley.
Northampton—W. L. Elzey, Exmore.

Executive Committee.

Samuel L. Byrn, Cambridge.
Warren C. Newton, Bridgeville.
J. Leonard Soper, Magnolia.
Walter B. Harris, Worton.
F. J. Dukes, Girdletree.

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Peninsula Horticultural Society.

THIRTIETH ANNUAL MEETING.

The Thirtieth annual meeting of the Peninsula Horticultural Society was held in the Opera House, Dover, Delaware, January 9, 10, 11, 1917. The President, J. Leonard Soper, presided at the sessions.

The meeting was called to order at 10 o'clock and the Rev. Floris Ferwerda, of Dover, led in prayer.

The following committees were appointed: Auditing, Chas. Barker, F. J. Dukes and E. A. Evans; Resolutions, W. I. Walker, C. A. McCue, and J. W. Taylor; Nominations, H. L. Cannon, W. B. Harris and F. M. Soper.

The following officers were elected: President, Samuel L. Byrn; First Vice-President, Warren C. Newton; Secretary and Treasurer, Wesley Webb. Vice-Presidents for the Counties: New Castle, A. W. Armstrong; Kent, A. W. Slaymaker; Sussex, A. O. Baker; Cecil, Charles B. Warburton; Kent, Maryland, Walter B. Harris; Queen Anne, W. Irving Walker; Caroline, J. S. Lapham; Talbot, Gen. Joseph B. Seth; Dorchester, Fred. Hirst; Wicomico, Fulton W. Allen; Worcester, G. Hale Harrison; Somerset, Frank E. Matthews; Accomac, A. J. McMath; Northampton, W. L. Elzey. Executive Committee, Samuel L. Byrn, Warren C. Newton, J. Leonard Soper, Walter B. Harris, F. J. Dukes.

Mr. W. Irving Walker offered the following resolutions which were adopted:

Resolved, That a committee of four, consisting of two members from Delaware and two from Maryland, be appointed by the President, whose duty it will be to communicate with the various farm organizations in Delaware, the Eastern Shore of Maryland, and the Eastern Shore of Virginia, and secure from said organizations their views upon a plan, to be formulated by said committee having in view the affiliation of all agricultural, horticultural, dairy, or other farm associations; and

Be it Further Resolved, That the report of said committee, with its recommendations, be submitted at the next annual meeting of the Society.

Mr. Walker also offered the following resolutions which were adopted:

Whereas, It has been brought to our attention that the proposition has been made to call all wheat containing any garlic "Sample Grade Wheat," when the new rules for grading winter wheat are promulgated by the United States Agricultural Department;

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Therefore, Be It Resolved, That this Association desires to record an earnest protest against the action above referred to and requests that proper grades be established for the different qualities of wheat containing garlic, thereby avoiding loss and injustice to the growers of our State and other sections, whose crops aggregate over 50,000,000 bushels of wheat. And be it further

Resolved, That a copy of these resolutions be sent to Mr. Duvel of the Agricultural Department at Washington, and also to each of our Senators and Representatives in Congress.

Prof. McCue, for the Committee on Resolutions, offered the following which were adopted:

Resolved, That the thanks of this Society be extended to the ladies of the Dover Century Club for their generous and gracious hospitality in extending a public reception to the members of the Society.

Resolved, That we thank the officials of the United States Department of Agriculture for permitting such able speakers from the Department to address our meeting.

Resolved, That the thanks of the Society be extended to the Delaware State Organized Militia for permission to use the Dover Armory as a show room.

Resolved, That the thanks of the Society be extended to the many exhibitors who aided in making the fruit show a success.

Resolved, That the thanks of the Society be extended to the various officers of the Society who made such excellent arrangements for the annual meeting.

Upon the motion of A. N. Brown, the Society extended a message of greeting and good will to Hon. C. J. Monroe, of Michigan, who attended a meeting of the Society in Dover a number of years ago and gave a most instructive address.

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REPORT OF THE TREASURER

WESLEY WEBB.

1916-1917.

RECEIPTS.

Balance, Jan. 12, 1916	$1343.59	
Delaware Appropriation	1000.00	
April 21, 1916, Maryland Appropriation for 1915	1000.00	
August 5, 1916, Maryland Appropriation	583.32	
Oct. 10, 1916, Maryland Appropriation	250.00	
		$4176.91

EXPENDITURES.

Gazette Publishing Co., premium lists	$ 15.42
Thomas & Evans Printing Co., show cards	22.50
Gustave Fox Company, buttons	13.00
Torsch & Franz Badge Co., 300 premium ribbons	21.07
A. W. Sisk, expenses as delegate to New Jersey	9.56
C. A. McCue, expenses as delegate to New Jersey	5.32
F. M. Soper, expenses as delegate to New Jersey	7.91
Wesley Webb, services and expenses for 1915	152.78
Arthur J. Farley, Judge of Exhibits and speaker	52.38
John W. Roberts, Speaker	10.30
W. C. Pelton, Judge of Vegetables	6.21
Easton Town Hall	40.00
Henry C. Webb, expenses	15.26
C. G. Ritter, stenographer	25.00
F. M. Soper, premiums	306.75
J. W. Killen, premiums	7.75
W. B. Gordy, premiums	4.00
Sanger Brothers, premiums	233.25
W. B. Harris, premiums	213.75
Gervis Hall, premiums	.75
Norman Hutchinson, premiums	26.50
Joseph B. Seth, premiums	9.00
J. Howard Hirst, premiums	46.50
Fred. Hirst, premiums	22.50

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Geo. T. Robinson, premiums	13.00	
J. W. Killen, premiums	10.00	
J. S. Kelley, premiums	6.00	
E. S. Godwin, freight on books and hauling	9.13	
Easton Star Democrat, printing proceedings	332.34	
J. F. Starling, Postmaster, postage	18.55	
J. F. Starling, Postmaster, postage stamps	10.00	
Gustave Fox Company, badges	15.00	
Torsch & Franz Badge Co., premium ribbons	24.07	
Dec. 28, J. F. Starling, Postmaster, stamps	20.00	
Jan. 8, 1917, Wesley Webb, salary & expenses for 1916	150.00	
		$1875.55
Balance		$2301.36

REPORT OF AUDITING COMMITTEE.

Your Committee appointed to audit the accounts of the Secretary and Treasurer of The Peninsula Horticultural Society, report that they have examined the same and report that they have found them correct, viz:

Balance on hand at last audit	$ 1343.59
Received during the year	2833.32
Total, including the balance	$4176.91
Disbursements	1875.55
Balance in hand January 9, 1917	$2301.36

CHARLES BARKER,
EDWARD A. EVANS,
Committee.

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REPORT OF JUDGE ON FRUITS.

PROF. ARTHUR J. FARLEY,

New Brunswick, N. J.

For Best General Display of Fruits—First prize, $150, to F. M. Soper & Son, Magnolia, Del.; second, $125, Walter B. Harris, Worton, Md.

Best Single Box—First, $25, Dover Fruit Farms, Dover; second, $15, W. B. Harris; third, $10, F. M. Soper & Son.

Best Three Boxes—First, $15, F. M. Soper & Son; second, $10, E. H. Bancroft & Son.

Best Five Boxes—First, $25, Walter B. Harris; second, $15, F. M. Soper & Son.

Best Ten Boxes—First, $50, F. M. Soper & Son.

Best Single Box—Jonathan, First, $5, E. H. Bancroft & Son.

Nero—First, $5, F. M. Soper & Son; second, $2, Benjamin Crook.

Paragon—First, $5, F. M. Soper & Son.

Rome—First, $5, F. M. Soper & Son; second, $3, E. H. Bancroft & Son.

Stayman—First, $5, F. M. Soper & Son; second, $3, E. H. Bancroft & Son; third, $2, Benjamin Crook.

Winesap—First, $5, Walter B. Harris; second, $3, F. M. Soper & Son.

York Imperial—First, $5, Walter B. Harris.

Three Barrel Collection—First, $15, Walter B. Harris.

Best barrel of the following varieties:

Ben Davis—First, $5, Walter B. Harris.

Paragon—First, $5, Walter B. Harris.

Stayman—First, $5, F. M. Soper & Son; second, $3, Delaware-Maryland Farms Co., R. F. Brown, Agent.

Winesap—First, $5, Walter B. Harris.

York Imperial—First, $5, Walter B. Harris.

Best Hampers of the following varieties:

Stayman—First, $5, Rev. Alfred Smith.

York Imperial—First, $2, A. W. Slaymaker.

Best plate of the following varieties:

York Imperial—First, $1.50, Walter B. Harris.

Arkansas Black—First, $1.50, E. H. Bancroft & Son.

Ben Davis—First, $1.50, F. M. Soper & Son; second, 75c., Walter B. Harris.

Delicious—First, $1.50, F. M. Soper & Son.

Gano—First, $1.50, F. M. Soper & Son.

King David—First, $1.50, E. H. Bancroft & Son.

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Lawver—First, $1.50, Walter B. Harris.
Lankford—First, $1.50, F. M. Soper & Son; second, 75c., Walter B. Harris.
Nero—First, $1.50, F. M. Soper & Son; second, E. H. Bancroft & Son, 75c.
Nickajack—First, $1.50, F. M. Soper & Son.
Paragon—First, $1.50, Walter B. Harris; second, 75c., F. M. Soper & Son.
Rome—First, $1.50, F. M. Soper & Son; second, 75c., E. H. Bancroft & Son.
Smith Cider—First, $1.50, Walter B. Harris.
Stark—First, $1.50, F. M. Soper & Son; second, 75c., Walter B. Harris.
Stayman—First, $1.50, Walter B. Harris; second, 75c., F. M. Soper & Son.
Winesap—First, $1.50, Walter B. Harris; second, 75c., F. M. Soper & Son.
Fallawater—First, $1.50, Walter B. Harris.

Best Collection of Nuts.

First, $5.00, J. W. Killen, Felton.
Collection of Chestnuts—First, $5.00, J. W. Killen.

Amateur Class—Apples.

Best Single Box—First, $15.00, Norman C. Hutchinson, Cordova, Md.; second, $10.00, Baker Brothers, Bridgeville, Del.; third, $5.00, W. M. Wine, Woodside.

Best Box Paragon—First, $5.00, Norman C. Hutchinson.

Stayman—First, $5.00, W. M. Wine; second, $3.00, Delaware-Maryland Farms Co.; third, $2.00, Benjamin Crook.

Winesap—First, $5.00, Baker Brothers.
Plates Paragon—Third, A. W. Slaymaker, Ribbon.
Stayman—First, $1.50, A. W. Slaymaker.
Winesap—First, $1.50, Baker Brothers.
York Imperial—First, $1.50, A. W. Slaymaker.

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REPORT OF JUDGE ON VEGETABLES.

PROF. W. C. PELTON.

Best Collection of Vegetables—First, $30, J. Howard Hirst, Cambridge, Md.; second, $25, Fred. Hirst, Cambridge, Md.; third, $20, J. W. Killen, Felton, Del.

Cabbage:—Of the following varieties: First, $2; second $1:

Danish Baldhead—Second, J. Howard Hirst.

Drumhead—First, J. Howard Hirst.

Flat Dutch—First, J. Howard Hirst.

Houser—Second, J. Howard Hirst.

Surehead—First, J. Howard Hirst.

Volga—First, J. Howard Hirst.

Best Educational Collection of White Potatoes—Third, $5, J. Howard Hirst.

Best Five-eighths Basket of Varieties of Potatoes—First, $2, second, $1.00.

Early Puritan—First, J. Howard Hirst.

Irish Cobbler—First, J. Howard Hirst; second, W. H. McKee, Dover, Del.

McCormick—First, J. Howard Hirst.

Red Bliss—First, Fred. Hirst.

Sir Walter Raleigh—First, Baker Brothers, Bridgeville, Del.

State of Maine—First, Fred. Hirst.

Russet—First, D. T. Mustard, Lewes, Del.

Best Collection of Sweet Potatoes—Second, $3, W. B. Gordy, Laurel; third, $2, J. W. Killen, Felton, Del.

Best Half Bushel Basket of following varieties—First, $2.

Big Leaf—First, W. B. Gordy.

Goldskin—First, W. B. Gordy.

Best Slip Seed Sweet Potatoes—$3, First, W. B. Gordy.

Carrots—First, $3, J. Howard Hirst; second, $2, W. H. McKee.

Celery—First, $3, J. Howard Hirst; second, $2, W. H. McKee.

Kale—First, $3, J. Howard Hirst; second, $2, Fred. Hirst.

Lettuce—Head, First, $3, J. Howard Hirst.
Leaf, First, $3, J. Howard Hirst.
Cos., First, $3, J. Howard Hirst.

Onions—Prizetaker—First, $3, E. W. Folk, Dover, Del.; second, $2, W. H. McKee, Dover, Del.

Parsnips—First, $3, W. H. McKee; second, $2, J. W. Killen.

Parsley—First, $3.00, J. Howard Hirst; second, $2, Fred. Hirst.

Pumpkins—First, $3.00, W. H. McKee, Dover, Del.

Salsify—First, $3.00, Fred. Hirst; second, $2, J. W. Killen.

Spinach—First, $3, J. Howard Hirst; second, $2, Fred. Hirst.

Turnips—First, $3, J. W. Killen; second, $2, J. Howard Hirst.

Beets—Second, $2, J. Howard Hirst.

Leek—Second, $2, J. Howard Hirst.

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ADDRESS OF WELCOME.

MAYOR ARLEY MAGEE,

Dover, Del.

Mr. President, Ladies and Gentlemen: You are assembled here today in your Thirtieth Annual Convention, and you are welcome. I hardly know how to start a speech. If I were talking to a body of strictly business men on a business proposition, or if I were talking to lawyers on legal questions, I would know how to approach the subject in a way. I am today attempting to address what is the greatest body of people in the American Nation. You represent the bone, sinew and stability of the American Government. In your homes you mold and fix business centers; in your homes you train honest boys for honest branches of life and they come into the administration of the affairs of the American Government. I myself am not a farmer, but I am interested in farming and have been for the last twenty years. Every farm that I have acquired, while I have had it, I have tried to make it a little better and have tried to make the spot a little brighter, and I want to say that if I were physically able to go to the farm, there is no law office that would hold me. Now, ladies and gentlemen, I have just a little to say; you have come to Dover, the capital of the State, and we think it the prettiest town on the Peninsula, and we are trying to make it as good a town as there is on the Peninsula; and with the help of the citizens of Dover we are going to have it said that it is not only the prettiest town, but one that is first and best. Mr. President, while your members are here I want to say to you, that the town belongs to you and to all of those who are assembled here. Make yourselves at home; if you don't see what you want, ask for it. If you see what you want, just take it, and you will be welcome to it. We hope your stay will be a pleasant one and that you will not attend another convention or another Thirty-first or Thirty-fifth annual convention without you come back to Dover.

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ADDRESS BY HON. CHARLES R. MILLER.

GOVERNOR OF DELAWARE.

Mr. President, Ladies and Gentlemen of the Agricultural Profession:—I appreciate the kind words of your President, but I am very much afraid that he is extravagant in his praise. I was very glad to hear Mayor Magee speak of the good government which you have in Dover, and I hope that such government shall be supreme in this little town. I congratulate the people of Dover and also Mayor Magee upon his success at the recent town election. I think we all might take the pattern from the people in Dover, for the one thing we want to work for, and the one thing we are bound for, is good government. I ventured to use the word profession because farming has become a profession. The day has passed when the man said "My son Bill is a right bright boy, I guess I will make a Doctor out of him, and George is a real intelligent boy, and I will make a lawyer out of him, and the third one is not very bright, so I guess he will be a farmer." Those days are past. Farming has become a science. Any man who practices farming now in the way his grandfather did in competition with the man who farms by up-to-date methods does not succeed like the man who is up-to-date. Our schools and colleges used to teach Latin and Greek and calculus; but now these things are in the background, and in their place young men and young women are being taught more practical subjects such as the science of Agriculture and home economics. Since the early ages the one question is how we shall sustain ourselves, how we shall produce so as to keep ourselves alive, and that is as much of a proposition today as it was when Joseph saved his people from famine in the land of Egypt.

And today we have got to meet those questions just as they were met in the past. But they are more serious today on account of the enormous population. There isn't any industry that doesn't depend upon the farming interests. Railroads are built to transport the farm productions, the steel mills are run in order to make rails for these roads. If you will pardon me I will try to give you an idea of what the farming industry in this country amounts to. In 1914, there were 6,500,000 farms in the United States, and about 1,000,000,000 of acres, and the value of farm products in that year was 9 billions of dollars, or one-half of all the clearances of all of the banks in the United States. It is five times the amount of corporation securities of all railroads in the United States. The one great industry in this country that is supreme and paramount to any other is the farming interests. The farms of the United States are worth probably 50 or 55 billions of dollars. When you realize today that the United States Government has 12,000 men every one working for the

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farmer and keeping in touch with the farmer, you will realize what the government thinks of agriculture; and having that in mind, I hope you will avail yourselves of the services of these agents, who are trained to help you along in Delaware and on the Peninsula. We are doing everything we can to help the farmer. We have Delaware College and Maryland has the Agricultural College, and we want you to patronize them because we are going to be drawn closer and closer together all the time.

There is another matter in which I am interested, that is the children. If you want to keep the boy and girl at home you have to create something to keep them there. Get your boy and girl interested in profitable agriculture and in home economics, and after they have studied and thought it out, fix it so that the children can get some of the financial results. I am interested in all of these movements, and I hope that at any time I can be of service to you, you will not fail to call upon me. I can assure you that the Board of Agriculture and the State Live Stock Sanitary Board have labored to our interests in Delaware. The only trouble with us is the limited amount of money we have, but I want to say that Delaware has an opportunity that few realize, and I hope that each succeeding year will be more profitable than the last.

RESPONSE.

MR. ORLANDO HARRISON.

On behalf of the Peninsula Horticultural Society we accept your welcome. We are glad, indeed, to be brought together in this city, and glad to say that this body of men and women are trying to take advantage from year to year of the associations and agencies that have been afforded us by the city, the Peninsula, the Delaware Legislature, and the Maryland Legislature, and all that has been done to keep this Horticultural Society going. We have gained considerable advantage and I am pleased to say that the agriculturists of the peninsula are in better condition financially than ever before. Only a short time ago some of our city newspapers saw fit to say that our farmers were getting too much money for their eggs and produce. I say on behalf of the agriculturists of this Peninsula that there is a day when we are able to get something from the sweat of our brow and that day is here, but even now our pay is only fair. While Governor Miller and Mayor Magee were speaking it seemed to me that if Tom Lawson could call himself a farmer, I believe Governor Miller and Mayor Magee could be listed as farmers, also, and we welcome them to our ranks and to our associations.

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PRESIDENT'S ANNUAL ADDRESS.

J. LEONARD SOPER.

Members of the Horticultural Society, Ladies and Gentlemen: This occasion is the Thirtieth Annual Session of the Peninsula Horticultural Society. It has witnessed many hindrances to the advancement of the interest it represents. It is organized not for the purpose of demanding exorbitant prices; it is not a business organization; it is simply an educational institution. Its members work that they and others interested might be better able to obtain better products. I take it that the Peninsula Horticultural Society is composed of men who are free to give as they are to receive information; men that have neither trade marks, or trade names, nor trade secrets.

There is no business in which men are so largely engaged in which there is such a degree of uncertainty as in farming. There are no laws or rules which we can apply with the assurance that we can obtain definite results. We cannot analyze so much raw material and add certain chemicals and know what the product will be. Manufacturers can duplicate the work of any other manufacturer in the world by following the same definite formula. No two farmers can produce a like article. Farmers and most especially those engaged in horticultural pursuits probably come under the laws of nature more than any other class of people. We simply find ourselves assisting nature, we may help, but we can neither grow or make the crops, and it is because of this uncertainty that so few attain to the uppermost round of perfection.

In the past we used to pride ourselves on being so near the center of the markets, lessening the transportation charges, but there are disadvantages as well, for we can ship our poorest apples to market and get something for them.

We are located nearer the great markets of the East than parts in the States in which market centers are located. This simply lessens the transportation charges. In other respects it is a hindrance. We are slowly awakening from our peaceful slumbers and we are slow to grasp our opportunities. We have been schooled, but our schooling seems to be incomplete. The Western fruit grower places on the market a pack that the consumers are willing to take without inspection. We have had in the past men who packed their fruit correctly. There have been attempts in the past to use a label and to believe that all packs so labeled were the same. We also have attempted to form organizations for marketing our fruits. But it matters not who runs such organizations, they cannot be a success when they attempt to dispose of the crop of fruit by grading it at the time it is delivered to the cars. The establishment of community packing associations is needed. We have attempted to gain for ourselves something without offering a straight pack to the consumers.

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By the community packing association men would be employed to manage the organization, assorting, grading and packing. Such an organization working under the present apple law, could make the packing uniform. The buyer would know that the fruit of Mr. B's standard pack would be like that of Mr. A's standard pack. At the present time the farmer must take the price that is offered by the broker or the consumer. He cannot dictate because he has not the proper packs to offer. If a broker would come to the manager of an organization and want to purchase so many barrels of Stayman's the Manager could tell that gentleman that he would deliver to him apples that he could depend on; and also so many barrels of Jonathan, etc. We would be able then to obtain results. One man alone cannot accomplish that thing for he would not have the quantity nor the standard.

Another question is the transportation question. Our fruit as we all know is not being delivered on the market as rapidly as it should. For example, we take the Philadelphia market, we are about 75 miles distant and we load our cars and start them in the early afternoon, not late in the day. Those cars should reach their destination the following morning in time that we should receive the highest prices. It is the rule that those cars never do get in on time, and it is the exception if ever a car gets in on time. Take our navigable creek and the fruit is delivered on time. The result of delay is that the fruit deteriorates rapidly. It is the same whether you sell your fruit to the broker or you ship it yourself.

The question as to whether your fruit is going to be in proper condition when it is sold is another thing we have to consider. It is up to you to sacrifice your fruit or hold it until the next morning, and if you held it until the second morning for sale you either have to re-ice or take chances. Our refrigeration system is much better than the past ventilation system. Under the present system we expect ice to serve a dual purpose, while we should only expect it to serve a single purpose. We give our orders for the cars to be iced, and we load our fruit in them. That ice has to cool the cars through and through, as they are pretty hot on a summer's day, and also have to cool the fruit; whereas, if the cars were pre-cooled through and through to a temperature of 78 degrees, then fill the bunkers with ice; the ice will then have a single purpose to perform, our fruit would reach its destination in proper condition. From the best authority that I can get this would probably cost in the neighborhood of $3.00 per car. These cooling stations should be controlled by the farmer, they should not be controlled by any of the ice producing plants on the Peninsula. As I said before, we are favorably located. Conditions here are excellent. We can raise the fruit of quality. Delaware has been known to raise fruit of quality and having the quantity that they obtain in other sections, our fruits would be sought by the consumers of the whole country. Our business is a paying proposition and always will be because the consumer demands produce of quality. It is up to us to make first place for Delaware and the Eastern Shore of Maryland, as an apple producing section.

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REPORT ON APPLES.

A. W. SLAYMAKER.

The year 1916 had its ups and downs for the Peninsula apple grower. With more trees in bearing than ever before, more good power-sprayers in operation, more discussion of improvement plans than ever was known, and a correspondingly more intelligent effort to do everything for the crop, and with more general setting of bloom than we have ever had, you will wonder why we are now able to report only a forty per cent crop of fruit. We are forcibly reminded of a certain day in early May when the trées were covered with a characteristic bloom, a thing of beauty hard to excel. All at once a false shade is seen in the beautiful coloring. Trees most brilliant in the morning had turned brown by night. Blossom blight is at work, and the only question is, will there be any fruit left. This great enemy took away more than one-half our crop in one or two days. The damage from coddling moth was considerable, and of course, we felt it more, having only a small crop on our trees.

Your committee feel that the important subject in this connection is the blossom blight on the apple tree of this Peninsula. We are told that it is a bacterial disease well known to science as pear blight. We have had some blight for many years, but never to threaten seriously our whole crop. We may have it as bad or worse another year. Can anything be done to help save our crop? We observe that some trees were worse than others. Very full trees blighted the worst, especially those that bore little or no fruit the year before. Old trees blighted worse than young ones, and I think trees not so well fed and not sprayed were worse than those well cared for in those respects. In other words, my observation leads me to believe that trees possessed of sufficient vigor to thoroughly support the whole number of blooms set were able to withstand the onsets of the enemy, just as a good healthy human system may go through epidemics and escape disease. What then can be done to aid in maintaining the vigor of our trees? One of the first essentials is annual bearing. If a tree fails to bear one year it will tend to set more blooms than it can care for the next year, and the crop maybe wiped out again as it was this year. It is also a fact that trees weakened by an overcrop of blighted blooms this year will not likely have the vigor necessary to carry a crop through next year. I believe that annual bearing habits can be encouraged in all apple trees and secured in most of our best varieties. Proper feeding and spraying will certainly help, but it is to intelligent pruning that I believe we must look for most help. It will take further experiment to reach the best methods, but certainly as we reduce the number of bearing limbs that are dependent on the roots for support there is more food left for the shoots that remain. If the

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trimming is done in mid-summer, the concentrated growth will help to mature and strengthen the buds for the ensuing year. Another consideration that will help make vigorous buds is the conservation of the water supply. Apples need a lot of water in the development of the growing crop, and of the fruit buds for a crop next year. Hence the necessity of careful and persistent cultivation. But it is a question whether with our present system of smooth surface cultivation we do not allow too much of our summer showers to run off and be lost. A recent article in Century Magazine tells how a grower near Lancaster has tried to solve this problem. He has dug a hole near every tree which he calls a water hole, to be filled with water during showers and gradually by seepage supply the needed water to the root system. The success of this experiment suggests to your committee that by the use of fluke harrow or shovel plow such as was used by the late J. G. Brown, the pioneer apple grower of central Delaware, we can leave the ground in narrow ridges which certainly will tend to keep the summer rain from running away so quickly as it otherwise would. Spray early and often is important in this connection, not that we claim that any spray mixture usually used will destroy the contagion of pear blight, but because the spray will tend to maintain the vigor of the tree by removing the fungous troubles that are always present to weaken the growth. Plenty of room between the trees as well as an abundant supply of plant food in the soil will help save the crop in the same indirect way, that is by adding to the vigor of the growing fruit spurs.

The Sooty Fungus showed rather more than usual on late apples this year. I believe it has not troubled trees that were well sprayed after June first, unless the trees were left so thick that it was impossible for the air to circulate freely and also for spray to reach the inner portions of the tree.

Some growers have lost many of their best apples through the work of the late apple worm which bites a hole in the side of the apple. The injury is usually not very extensive, but any blemish will throw these apples in second or third grade. It is hoped that scientific experiment will shed much light on this trouble.

The need of co-operation to advertise our apples as well as to sell them, is one of the crying needs of the times. The necessity of some good selling organization will become more pressing every year as the increasing acreage comes into bearing. Such organizations as the Delaware Apple Grower's Association should have the support of all our growers.

The need of cover crops in our orchards becomes more apparent every year. We recommend crimson clover for young orchards and cowpeas, when the trees so occupy the ground that a good catch of crimson clover cannot be expected.

The new system of spraying under very high pressure (300 lbs. or more), should be tried in a small way first, as we know there is danger of injury from so strong a discharge to the small fruits and even the small twigs when they get the full force of such a stream of solution.

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ORCHARD FERTILIZATION.

BY J. P. STEWART,
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The efficient use of fertilization in orchards is a matter upon which there has been much confusion. Analyses have always shown that fruit trees in full bearing make comparatively large demands on the plant food supply of the soil. At the same time, many of the definite experimental attempts to improve yields through applications of plant food were relatively unsuccessful. Some of the reasons for the failure are now becoming apparent.

Information along this line is given in Table I, which shows the results obtained in the Johnston orchard in western Pennsylvania. This orchard had been receiving more than average care in all other respects, but had never received any fertilization. The trees were Baldwins, 20 years old in 1908 when the experiment was started. Their general appearance was comparatively good, but their yields had never been heavy. The soil was Volusia silt loam, of which there are over 6,000,000 acres known to exist in Pennsylvania, New York and Ohio.

The treatments used in the experiment were as follows:

Wherever nitrogen was used it was at the rate of 50 pounds of actual N to the acre. It was carried in nitrate of soda and dried blood, using about 165 pounds of the former and 200 pounds of the latter annually. The phosphorus was added at the rate of 100 pounds of P_2O_5 to the acre, and was carried in acid phosphate, using about 670 pounds annually. Up to the last two years, the potash was applied so as to carry 150 pounds per acre of K_2O, and hence required 300 pounds of the high grade muriate. Since 1914, the potash application has been reduced one half. The lime is applied at the rate of 1000 pounds per acre of C_aO annually or its equivalent, and the manure at the rate of 12 tons to the acre. No tillage has been given in the fertilizer section during the entire course of this experiment, the fertilizer merely being spread broadcast under the trees and left to be carried down by the rains. The results on yield are given in Table I.

For the present we are interested in the upper section of this table, which shows the results from the fertilizer portion of the experiment. In it the plat receiving phosphorus and potash only, shows an average gain of less than 43 bushels per acre annually. The trees on this plat, however, have shown no appreciable superiority over the adjacent checks, or unfertilized plats, in either growth or foliage. Even the small increase shown in yield, therefore, may be partly due to normal variation, and in any event it is evident that here has been no imporant profit from this treatment, even at normal

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TABLE I.—INFLUENCE OF FERTILIZATION AND CULTURAL METHODS ON YIELD. (Expt. 338.)
(Average Annual Yields of Fruit per Acre.)

Plat	Treatment	1909-12	1913-16	1909-16	Gain over Nor. Yield
		bu.	bu.	bu.	bu.
1	Check (Unfertilized)	136.7	304.6	220.6	.....
2	Nitrogen & Phosphorus	543.1	530.9	538.5	294.0
3	Nitrogen & Potash	467.7	520.7	494.2	229.8
4	Check	213.0	359.5	286.2	.....
5	Phosphorus & Potash	277.6	364.1	320.8	42.7
6	Nitr., Phos. & Potash	513.8	546.8	530.3	260.3
7	Check	186.7	337.2	261.9	.....
8	Manure	637.5	513.4	575.4	327.3
9	Lime (& NPK, 1912)	165.9	546.6	356.2	121.8
10	Check	160.5	280.9	220.7	.....
11	Tillage & Covercrop (Fltzr. 1912)	417.6	444.6	431.1	106.8*
12	Mulch (Ftlzr. 1912)	365.8	525.6	455.7	131.4*
13	Sod (Ftlzr. 1912)	205.1	443.5	324.3	.....

*Gain over Sod. The check plats have averaged 247.3 bu. per acre. Variety —Baldwin, planted in 1889.

prices for the phosphorus potash used. This treatment, moreover, is the one that has been commonly recommended for increasing yields in orchards, and is still widely used whenever available.

The lime application also has failed to show any direct benefit to yield. This is apparent both in the first 4-year period, in which lime was applied alone, and in the second period in which it has been used in connection with a complete fertilizer. Lime may often have an indirect value, however, by favoring the growth of clover or other leguminous covers between the trees, which in turn may exert considerable influence on the yields of fruit, when properly handled.

The fertilizer which has exerted the most profound influence on yields in this case, however, is very evidently nitrogen. Wherever this element has been applied, either in manure or commercial forms, it has vastly increased the yields. The difference in fertilization, moreover, is the only important difference, either in trees or treatment, that exists among these plats.

The cost of the commercial nitrogen used here is about $9 to $10 per acre at normal prices or about a half more than that at present prices. The manure costs $25 to $30. Both forms of nitrogen are probably used in considerable excess of the real requirements, although they are showing profits of many times their cost, even at their present rates and prices.

The phosphorus application is apparently of some importance here also, as indicated by the relatively large gains where it is applied in addition to the nitrogen. Its rate of application is also high — practically double the amount that we now recommend — and its cost at the present rates and prices is about $5 per acre.

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Results From the Brown Orchard.

The next table shows the results from a 16-plat experiment started in 1908, south of Bedford, and within about 18 miles of the Maryland line. The rates of treatment are the same as above. The present experiment, however, involves some comparison of different carriers of phosphorus and potash, and also involves a plat receiving nitrogen alone. The soil in this case is technically known as DeKalb stony loam. It was rather heavily farmed for several years before the orchard was planted, and was, therefore, in a low state of fertility when our experiment was started. No tillage has been given during the progress of the experiment.

TABLE II.—INFLUENCE OF FERTILIZATION ON YIELD. (Expt. 220.)
(Average Annual Yields Per Acre.)

Plat	Treatment.	1908-12 bu.	1913-16 bu.	1908-16 bu.	Gain over Nor. Yield bu.
1	Check	233.7	184.9	212.0	.....
2	Nitrogen & Phosphorus	553.0	502.9	530.7	367.9
3	Nitrogen & Potash	383.0	265.1	330.6	216.9
4	Check	76.8	49.3	64.6	.....
5	Phosphorus & Muriate	162.0	80.6	125.8	46.6
6	Phosphorus & Sulphate	98.2	90.0	94.5	0.7
7	Check	116.4	98.5	108.4	.....
8	Nitr., Phos. & Potash	336.9	245.4	296.2	190.5
9	Nitrogen	199.0	154.0	179.0	75.9
10	Check	94.1	108.6	100.5	.....
11	Acid Phos. (Slag & NK, 1912)	72.4	182.7	121.4	20.6
12	Floats (& NK, 1912)	44.7	234.8	129.2	28.1
13	Check	105.4	96.1	101.3	.....
14	Manure	323.1	354.2	336.9	255.0
15	Lime (& Ftlzr., 1912)	73.7	254.1	153.9	91.5
16	Check*	48.8	35.5	42.9	.....

*Check plats have averaged 104.9 bu. per acre.
Yorks planted in 1888, Baldwins in 1898.

In general the results here are very similar to those in Table I, nitrogen again being clearly the most important element.

The exceptionally high yields in plat 2, which receives a combination of nitrogen and phosphorus, are partly due to the fact that these trees are being benefited by leachings from the forest floor on the mountainside above, from which the experiment is separated by a single row of trees. This leaching influence is especially marked on the first check plat, but it has wholly disappeared on the 4th plat. Its influence in plats 2 and 3 has been partly eliminated by the use of the normal yields as the basis for calculating gains, but it seems probable that a further decrease of about 25 per cent in the yield of plat

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2 and of approximately 10 per cent in plat 3 would be necessary in order to bring these plats down fully to the level of the others in the experiment. Such a reduction would leave annual gains of 236 bushels per acre in plat 2 and about 184 bushels in plat 3, which would still compare very favorably with those from the other treatments.

One of the chief values of this experiment is in the light that it throws on the effect of nitrogen and phosphorus alone as compared with their effect when applied together. In plats 11 and 12, for example, acid phosphate and floats — the finely pulverized phosphate rock — were applied alone for 6 years, without any visible beneficial effects, as shown by their average yields in the first column. Nitrogen alone in this experiment has increased the yields by about 76 bushels per acre annually. The combination of nitrogen and phosphorus, however, has given an average increase of at least 236 bushels per acre after making the deduction indicated in the preceding paragraph. This would indicate that even where nitrogen is of chief importance, it is likely to need some assistance from other materials before it can exert its full influence.

As to the permanence of the benefit of the nitrogen and phosphorus application, good evidence is available in the results shown in plat 2 of the present experiment. Beginning with 1907, in which the first application was made on July 8, the yields in bushels per acre have been as follows: 75.4, 569.6, 80.6, 812.0, 304.3, 998.6, 160.4, 720.0, 198.5, and 932.6. The average gain from this fertilization during the last 9 years of this period, as shown in the table, has been practically 368 bushels per acre annually, while the average unfertilized yield has been only 105 bushels during the same period. These results do not show any evident indication of any lack of permanence in effect, and it is highly probable that very similar effects can be secured in many other orchards, wherever the fertility need is beginning to be felt.

Results in Younger Orchards.

The next two tables show the results obtained in two younger orchards, on heavier and apparently more fertile soil. The first of these is from the Strode orchard near Westchester, about 8 or 10 miles from the Delaware line, and the other is from the Tyson orchard, located about 9 miles north of Gettysburg. The usual orchard tillage has been followed in both cases. The treatments are the same as before.

These results are noteworthy in at least three respects, viz., the high yields of the checks for the age of the trees, the relatively small gains secured from the fertilization, and the very large increases shown on all plats in the second 4-year periods. In Table III, the relative size of the gains from the various treatments is about what one should expect, but in most cases their actual size is too small as yet to clearly justify the cost. In both experiments, the gains due to the mere increase in size and age of the trees are by far the most important, up to the present time. It remains to be seen just how long these two influences can maintain the present yields, without some outside assistance to keep up the fertility of the soil. In general, however, these results may be considered typical of orchards of this general age, although we have important exceptions.

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TABLE III.—INFLUENCE OF FERTILIZATION AND CULTURAL METHODS ON YIELD. (Expt. 336.)

(Average Annual Yields of Fruit Per Acre.)

Plat	Treatment.	1909-12 bu.	1913-16 bu.	1909-16 bu.	Gain over Nor. Yield bu.
1	Check	105.1	418.2	261.7	.....
2	Nitrogen & Phosphorus	145.7	465.8	305.8	48.7
3	Nitrogen & Potash	135.3	460.7	298.0	45.6
4	Check	139.7	355.8	247.8	.....
5	Phosphorus & Potash	147.7	346.3	247.0	18.5
6	Nitr., Phos. & Potash	151.8	368.6	260.2	51.0
7	Check	121.2	258.6	189.9	.....
8	Manure	215.1	417.6	316.4	102.9
9	Lime (& NPK, 1912)	141.1	390.6	265.9	28.8
10	Check	109.9	411.6	260.8	.....
11	Tillage and Covercrop	51.5	198.3	124.9	60.1*
12	Sod-Mulch	60.1	237.6	148.9	84.1*
13	Sod	26.4	103.2	64.8	.....

*Gain over Sod. The check plats have averaged 240.1 bu. per acre.
Fertilizer trees planted in 1901. Cultural plats, 11 tc 13, in 1903.

TABLE IV.—INFLUENCE OF FERTILIZATION ON YIELD. (Expt. 213.)

(Average Annual Yields of Fruit Per Acre.)

Plat	Treatment.	1908-12 bu.	1913-16 bu.	1908-16 bu.	Gain over Nor. Yield. bu.
1	Check	58.7	410.7	215.1	.....*
2	Nitrogen & Phosphorus	60.3	491.2	251.8	38.4
3	Nitrogen & Potash	79.9	624.7	322.0	110.4
4	Check	50.1	409.6	209.9	.....
5	Phosphorus & Muriate	76.2	510.9	269.4	65.2
6	Phosphorus & Sulphate	77.8	556.5	290.5	92.1
7	Check	56.4	363.0	192.7	.....
8	Complete Fertilizer	66.6	523.7	269.7	76.7
9	Nitrogen	50.4	391.8	202.2	8.9
10	Check	44.9	379.6	193.6	.....
11	Acid Phos. (Slag & NK, 1912)	42.5	509.4	250.0	33.8
12	Floats (& NK, 1912)	59.2	501.6	255.8	17.1
13	Check	51.5	523.7	261.3	.....
14	Manure	54.8	542.3	271.4	28.2
15	Lime (& NPK, 1912)	61.0	480.4	247.4	22.3
16	Check*	54.9	397.2	207.0	.....

*Check plats have averaged 213.3 bu. per acre. Tree planted in 1900.

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Table IV is also of interest in the fact that it shows at least one case in which potash is of greater importance in improving yields than either of the other principal elements. The gains are not entirely consistent throughout, but in general potash is clearly in the lead in this experiment, with nitrogen and phosphorus following in the order named. The practical failure of manure, along with the nitrogen and phosphorus, is also noteworthy here. In the preceding table, the relatively high rank of the manure is apparently largely due to its moisture conserving capacity, as is indicated by the similar gains shown by the mulch treatment in plat 12.

Relative Value of Different Carriers.

In Tables II and IV, a comparison of different carriers of phosphorus and potash was made. A similar comparison was made in the Wertz orchard, near Chambersburg, in Experiment 216. As already stated, the phosphorus plats, 11 and 12, were fertilized with the single elements until 1912 in these experiments, without any beneficial effects. In that year the fertilization was completed by the addition of nitrogen and potash, and basic slag was introduced, thus giving a comparison of three carriers of phosphorus in connection with nitrogen and potash since 1912. The results from the different phosphorus carriers for the last 4 years, and from two carriers of potash for the last 8 years of a 10-year period are shown in Table V.

TABLE V.—RELATIVE VALUE OF DIFFERENT CARRIERS OF FERTILIZER ELEMENTS.

(Average Annual Yields Per Acre, 1913-16, Inclusive.)

Plat	Treatment.	Expt. 215 bu.	Expt. 216 bu.	Expt. 220 bu.	General Average bu.
8	Acid Phosphate & NK.....	523.6	322.1	245.4	363.7
11	Basic Slag & NK.....	509.4	301.0	207.7	339.4
12	Floats & NK.....	501.6	256.9	235.0	331.2
5	Muriate & Acid Phos.....	302.8*	221.9*	124.1*	216.3*
6	Sulphate & Acid Phos.....	326.1*	225.9*	101.4*	217.8*

*Eight-year averages.

From these results it is evident that there is no appreciable difference in efficiency between the high-grade muriate and sulphate of potash. The average yields from all three experiments show a difference of less than two bushels per acre annually for the last eight years. Similar results are shown in a peach experiment in Erie County, started in 1912, in a comparison involving the low-grade sulphate or "double-manure salt" as it is usually known commercially. In the peach experiment, however, the muriate is in the lead at present. On the basis of costs, therefore, it is evident that the preference should be given to the cheaper material, which, under normal conditions, is the muriate.

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In the case of the phosphorus carriers, there is also no material difference in efficiency between the basic slag and the "floats" as shown by the general averages. On the basis of relative costs, therefore, the advantage is rather distinctly in favor of the floats, so far as these two carriers are concerned. The acid phosphate, however, has shown a uniform and fairly marked superiority over both other materials, its average gain being slightly over 24 bushels per acre annually. This should give it the preference, at least under untilled conditions such as those which have obtained in the third of the present experiments. Similar work in Ohio has shown acid phosphate to be superior to bone meal, under untilled conditions at least. The choice among phosphorus carriers, therefore, would seem to lie between acid phosphate and floats, with the former preferred, excepting possibly in special cases.

In the case of nitrogen, the results in Ohio and Oregon indicate the marked superiority of nitrate of soda over other carriers, both in quickness of action and in the gains secured. It is undoubtedly preferable wherever tillage is omitted, and it is likely to be at least equal to any other nitrogen carrier in the net profits secured, in orchards receiving tillage.

Plan For Local Fertilizer Test.

The preceding results have been ample to show the great importance of orchard fertilization in many cases. The marked difference in response that are often shown by individual orchards, however, always make it advisable to run some actual test on the fertility needs of any orchard before expending any large amounts in this direction. A simple plan for such a test is given in Table VI. There is no other method now known of securing reliable information on the fertility needs of an orchard, and without this information one simply remains in the dark in his fertilizing operations.

TABLE VI.—PLAN FOR LOCAL ORCHARD-FERTILIZER TEST.

(Pounds For a Mature Tree in Bearing.)

1.	Check (Unfertilized).
2.	Nitrate of soda, 5 lbs.
3.	Nitrate, 5 lbs.; Acid phosphate, 10 lbs.
4.	Nitrate of soda, 5 lbs.; Potash, 2 lbs.
5.	Check.
6.	Acid Phosphate, 10 lbs.; Potash, 2 lbs.
7.	Nitrate, 5 lbs.; Acid phosphate, 10 lbs.; Potash, 2 lbs.
8.	Manure, 400 lbs.
9.	Check.

Use at least 6 trees to the plat, preferably in double rows.

This test should be located in a typical section of the orchard and should include not less than 6 average trees of the same variety and age in each plat. All the trees should be labeled and carefully measured at a fixed point on the

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trunk, and the applications and exact records of both yield and growth should be maintained for at least 3 years. Good indications of the orchard's needs may often be obtained in much less time, but this amount should be allowed in the plans. Where space permits, and especially where annual leguminous cover-crops are being used, it would be well to add another single element plat between 1 and 2 to carry acid phosphate. A plat for potash or for a leguminous cover alone might also be inserted between 5 and 6, if fuller information is desired. The test as above shown, however, will give most of the fertility information needed in the majority of orchards, with a surprisingly small expenditure in time, money and effort.

Time And Method of Application.

In making this test and also in the general fertilization of orchards, it appears that the time of application is important. This applies especially to the nitrogen. At present, the majority of the evidence indicates that the most efficient time to apply nitrate of soda is shortly after the buds start and before the blossoms open. In both Ohio and Oregon, applications at this time made decided increases in the crop of the same year. This was accomplished by materially increasing the size and vigor of the blossoms and the percentage of fruit set. The injury from frost was also reduced. The actual number of blossoms was naturally not affected by such applications, as the blossoms are developed the preceding season. The applications of one year, however, will usually materially increase the number of blossoms in the following year, as shown regularly in the Pennsylvania experiments.

For the most direct and immediate returns, therefore, the application slightly ahead of the bloom now seems preferable for the nitrogen, and hence for all commercial materials. This is because the other fertilizer elements are apparently not exacting in their time requirements. It is most convenient, therefore, to apply them along with the nitrate, at the time considered best for it. Manure can be applied at almost any time, excepting possibly late summer or fall, without danger of loss or of ill effects.

One of the functions of proper fertilization, however, is to develop and maintain steadier yields, as well as those that are larger. To do this most efficiently and economically it is desirable to do some of the nitrogen fertilization at least, after the fruit has set. This is in order to permit one to vary the rate of application somewhat in accord with the size of the crop set on the trees. This can be readily accomplished by dividing the nitrogen application, or the entire application if preferred, and applying part of it ahead of the bloom, as above stated, and the remainder after the fruit has set. About a month after fruit set is probably as good a time as any, although we have had some excellent results from applications as late as the 8th of July.

Our method of application has been merely to scatter the fertilizer or manure broadcast under the trees, taking care not to get it too close to the trunks, where there are few absorbent roots, and extending the application well out beyond the spread of the branches. To conform more closely with the usual distribution of feeding roots, the application is made heaviest over the

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area covered by the outer two-thirds of the branches. This fertilization may be left on the surface to be carried down by the rains, or it may be harrowed or lightly plowed into the soil. The latter is apparently preferable in some cases, especially where the mineral elements are chiefly involved.

An Orchard Fertilizer For Immediate Use.

If one wishes to apply a fertilizer over most of his orchard, before the results of the local test are available, I would suggest that the application named in plat 3 of the local test be used. The manure application mentioned in No. 8, is also excellent, if available, though it is considerably slower in action. The nitrate of soda alone, at the rate of 5 pounds per tree, applied as stated above, is undoubtedly the simplest and quickest fertilizer available, and in some cases it may be all that is needed. But in the writer's opinion the combination of nitrogen and phosphorus is more likely to give large and permanent effects, and hence they should be generally used until the results from the local test show something else to be preferable.

Discussion.

Question—Did you ever try phosphorus applications in connection with legumes to furnish the nitrogen?

Dr. Stewart—No. But our annual tilled cover crops have not been nearly so good as the artificial sources of nitrogen. It is possible that in a sandy soil that you can get more out of these cover crops than we do on the heavier soils. That is probably one of the reasons why our cover crops have been less serviceable. The soils are so heavy as a rule that under our conditions either manure or nitrate of soda are far superior. I believe that there are two reasons for that, first, that the cover crops hold the moisture that the trees should have and the return of nitrate to the soil is much slower than it is in sandy soil. No nitrogen becomes available to the trees from a covercrop plowed under in the middle of May until the middle of July. On the heavier soils in particular, the benefit from cover crops accompanied by annual tillage seems to be very slight.

Question—Did you recommend phosphorus in the form of floats with manure, or not?

Dr. Stewart—I don't know whether it would be of special value to the trees or not. It may assist in holding the nitrogen or ammonia, making a considerably richer application in the elements most needed, and hence you could use less of it. If the manure were reinforced with acid phosphate, it would assist materially in holding the nitrogen.

Question—Does nitrate of soda deteriorate during the dry seasons?

Dr. Stewart—I don't believe that it deteriorates very much, if any. In other words, it does not change into ammonia in the way that manure does when left lying around.

Question—Do you conclude that a more or less acid soil is better for apples?

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Dr. Stewart—I would hardly say that, but it does appear that the soil does not need to be alkaline for apples. I am inclined to think that an apple tree is rather neutral on the matter of soil acidity. I neglected to state that one grower in Pennsylvania simply puts on lime and phosphorus in his orchard, and he keeps his clover permanently without sowing any seed at all. It can not be done on all soils, however.

Prof. McCue—I have been interested in Dr. Stewart's talk on fertilizers. Nitrogen is important on peaches. We will probably find good results if we change our method and put our nitrogen on early.

Dr. Stewart—The two things to remember about nitrogen are time of application and quantity to use. The best time of application appears to be a little ahead of the blossom and probably the best amount will run around five or six pounds per tree. If your trees are bearing fairly well, the best thing to do would be to apply about five pounds to a tree of nitrate of soda and eight to ten pounds of acid phosphate on a typical portion of the orchard and watch your effect. Not all orchards need fertilizers. To find out you have to ask the tree.

Prof. McCue—The fertilizer is a last treatment. Do the other things well and then if your trees still seem to need something then it is time to think about the fertilizer. Last year we found two or three peach orchards that did not need fertilizer. Mr. Maloney's peach orchard at Lebanon is one orchard. Be sure you are right then go ahead. Cultivate thoroughly a peach orchard and you can often eliminate all fertilizers.

Question—What about apple orchards?

Dr. Stewart—In apple orchards I would say that it is not possible to get the maximum production for a considerable series of years by any type of cultivation alone. Many of our older apple orchards need plant food. Sometimes they get along for quite a while without it. In one of our experiments at the end of six years we would have said that in that apple orchard the addition of either manure or fertilizer to tillage and cover crops was unnecessary, but in the next four years the unfertilized trees have produced very much less than those that received fertilization in addition to tillage and cover crops. Peach trees also need plant food. In fact they are rather heavier feeders than apples. The more I look into the plant food proposition among fruit trees the more I am convinced of the great importance of nitrogen on all kinds of fruit trees. Apple trees in Pennsylvania, Ohio, and Oregon all require nitrogen. Citrus trees in California respond to nothing but nitrogen. I don't want to give the impression that nitrogen is the only thing, but it is very important. My advice is to try it out in your orchard and see whether the addition of some commercial nitrogen a little before the blossom, will not give you better average results over a series of years than anything you had before.

Mr. Harrison—We found that nitrogen doubles the crop this year but lessened the next season crop in peaches. We have found for five years in succession that the best method in handling a peach crop is thorough pruning and applying more of the sunshine and the nigger and the mule and thorough cultivation. There is nothing equal to it, and I believe you can keep the life of the peach crop much longer. Thorough cultivation is all that we do to our peach

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orchards. We put a little manure around them in the early years and try to grow the tree without too much net outlay by growing the tomato between the rows. After this orchard comes in bearing we do not give it any more fertilizer except when we can get potash.

P. Emerson—I planted a Kieffer pear orchard on a very sandy piece of ground and alternated it with peach. Those trees would not bear but 200 or 300 baskets and I felt discouraged, but I remembered the results that I had gotten from an orchard previously. I concluded that I would supplement the cultivation. Cowpeas made a nice carpet to pick my pears. That winter I used rye and a little manure. Whereas, I had only been getting 200 or 300 baskets and the next year I got 3000 baskets. I repeated the same thing and I got 4000.

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CULTURAL METHODS IN APPLE ORCHARDS.

J. P. STEWART, EXPT'L. POMOLOGIST,

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What is the best method of handling the soil about orchard trees? Like most other questions this one is best answered by referring it to the most direct and original source of information available, which in this case is the trees themselves. To do this naturally requires experiments. The experiments used and the answers secured in Pennsylvania during the last 9 or 10 years are largely covered in the present paper.

The first of these experiments is located in the Experimental Orchard at The Pennsylvania State College. Its object is to determine the best methods of handling the soil about a young apple tree. The experiment contains 8 different treatments, which are named in Table I. The area now covered by the first five of those treatments, or plats 2 to 6, was plowed in the fall of 1907 and prepared about as for corn in the spring of 1908, when all the trees were planted. Since then the several treatments named in the table have been followed annually. The plats consist chiefly of 45 trees each, and involve 3 varieties.

In plats 7 to 9, no tillage of any kind has been given. The trees on these plats were merely planted in the rather thin sod then occupying the ground, in holes dug with a spade, and were immediately mulched with straw at the rate of about 100 pounds to the tree. Since then the growth between the trees has been cut at least twice annually, and that obtained in the first cutting has been added to the mulch, while the second cutting has been left where it fell. In addition, the initial mulch of outside materials has been renewed by similar applications approximately every alternate year.

The soil involved is a rather heavy silt or clay loam, of limestone origin, and belongs in the Hagerstown series. It had been farmed rather heavily for many years, prior to our possession in 1907, with little or no return in the way of fertilization.

The fertilizer used in all the experiments discussed in this paper consists of about 20 pounds to the tree of a commercial mixture containing approximately 6 per cent nitrogen, 10 per cent phosphoric acid (P_2O_5), and 10 per cent potash (K_2O). The manure is applied at the rate of about 12 tons per acre. All fertilization is applied annually. The results of all treatments in the present experiment to the close of the 9th year are shown in Table I.

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TABLE I—INFLUENCE OF CULTURAL METHODS ON GROWTH, YIELD AND MOISTURE, IN YOUNG ORCHARD.

(Expt. 331, College Experimental Orchard, 1908-16.)

Plat	Treatment.	Av. Gain in Girth	Gain over Tillage	Total Yield	Moisture Content '13	General Rank
		in.	Per cent	lbs.	Per cent	
2	Tillage alone.....	10.31	.....	554	10.6	8
3	" and Intercrop..	11.56	12.1	1374	5.5	6
4	" and Covercrop.	10.77	4.5	446	8.5	7
5	" C-crop & manure	12.39	20.2	2091	9.2	3
6	" C-crop & Ftlzr..	12.02	16.6	1420	9.4	5
7	Mulch	12.09	17.3	2318	17.1	4
8	Mulch and Manure....	12.43	20.6	3089	18.2	2
9	Mulch and Ftlzr.....	12.88	24.9	3645	18.1	1

Varieties — Baldwin, Stayman Winesap and York Imperial, planted in 1908.

In these results, it will be noted that the plat receiving tillage alone has shown the least increase in tree growth, which is probably the most reliable basis of comparison at the present time. This low growth rate is probably connected with the hard, baked condition of the soil, practically devoid of humus, which is being developed under this treatment. The addition of annual leguminous cover crops, however, has apparently done but little to improve the situation, as is shown by the results in plat 4. At the same time, the addition of manure or commercial fertilizer to the cover crop treatment, in plats 5 and 6, has given very satisfactory increases in both tree-growth and fruit. It is evident therefore, that the tillage and cover crop treatment alone is not always sufficient to meet all the needs even of young trees, and their demands are naturally much less than those of trees in bearing.

The most interesting of the present tillage treatments, however, is the one involving the intercrop. This treatment has not only shown none of the ill-effects, which are commonly expected from intercrops, but on the other hand the trees in this plat are actually growing and bearing distinctly better than those in any of the other tilled but unfertilized treatments. Similar results on growth were obtained in Nebraska over a two-year period and reported in 1903 in their bulletin 79.

The intercrops used by us have been tilled annually, with proper fertilization for the crops, but with nothing applied directly to the trees. There would naturally be no practical objection to such direct applications, and the addition of a moderate mulch of manure or its equivalent around the trees should improve the treatment very materially. Such a plan should give practically all the benefits now shown in the cover crop and manure plat, along with the financial returns that are possible from proper intercrops. A suitable winter cover of rye or of rye and vetch has also been used in the present inter-

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crop plat, and such a cover is desirable. Wherever tillage is available, therefore, we now believe that a proper use of intercrops, accompanied by winter covers and suitable fertilization for both trees and crops, is generally the best and most practical method of managing the soil about a young apple tree. The names of suitable crops for this purpose and a plan of rotation for them are given later.

Where tillage and intercrops are not considered practicable, however, the results in the mulched plats, 7 to 9, show that the mulching plan is likely to be very satisfactory. The mulching treatments are naturally not self-supporting, as the intercrop plan may be, under proper conditions, but thus far their total effects on the trees have averaged considerably better than any others in the experiment. With the definite appearance of yields, moreover, the advantage in net returns may also be in favor of the mulch treatment within the near future.

Similar results are shown in another experiment in the western part of the State, and also in an experiment in Ohio, as reported in their bulletin 171. The efficiency of the mulching treatment on young trees is, therefore, evident, and it is simply a question of economics whether it is to be given the preference over tillage and intercrops or not.

The gains from fertilization are now showing up rather strongly here, especially in the matter of yields, all of which is somewhat surprising in trees so young. The conservation of moisture is still the chief influence, however, as indicated by the generally superior yields in all the mulched plats. In this case the actual gain from the manure has been greater in connection with tillage, while that from the commercial fertilizer has been greatest in connection with the mulch.

Results From a Young Bearing Orchard.

In the next table, we have the results from a similar but larger experiment, involving trees in the early stages of bearing. This experiment was started in 1907 in Bedford County in the orchard of Joseph Sleek. The soil in this case is a very gravelly loam, derived chiefly from impure cherty limestones and calcareous shales, and is classed as Frankstown stony loam by the Federal Bureau of Soils. The stones are exceedingly numerous, but small, so that cultivation is not difficult, and the soil is commonly considered good for corn or other farm crops.

The trees were in their 6th year when the experiment was started. The early yields were naturally light, and hence only those of the last 6 years have used in estimating the influence of the various treatments on yields. These yields cover the crops from the 10th to the 15th years inclusive of the trees' age. The effects on growth, however, are computed for the entire 10-year period. The results of the treatments are shown in Table II. In it and the table following the treatments are ranked in order of excellence under the same kind of fertilization.

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TABLE II—CULTURAL METHODS ON YIELD AND GROWTH. (Expt. 219.)

(Aver. An. Yields per Acre 6 Yrs., 1911-16.)

Treatment.	Tillage	Tillage & Cover crop	Sod-Mulch	Sod
	bu.	bu.	bu.	bu.
Without Fertlz'n	71.0	92.6	185.7	82.9
Rank	4	2	1	3
With Manure	232.2	178.2	240.1	154.2
Rank	2	3	1	4
With C. Fertlz'n	196.4	239.3	194.4	124.8
Rank	2	1	3	4

INFLUENCE ON GROWTH, 10 YEARS, 1907-16, INCLUSIVE.

	Average Gain in Trunk-girth.			
	in.	in.	in.	in.
Without Fertilization	15.46	15.36	16.70	13.36
Rank	2	3	1	4
With Manure	18.78	17.76	19.37	17.55
Rank	2	3	1	4
With C. Fertlz'n	17.22	18.63	18.48	16.45
Rank	3	1	2	4

In these results, the high efficiency of the mulch treatment in improving both yield and growth is still very evident. The most striking developments here, however, are the remarkable gains that have been produced in practically all treatments by means of fertilization. In the treatment involving tillage alone, for example, the annual yield for the past 6 years has been only 71 bushels per acre, while the mere addition of manure to this treatment has increased the yield to more than 232 bushels per acre. Similar gains are shown in other plats, but with the largest net increases occurring in connection with tillage. This apparently indicates the importance of the less soluble materials in this case, and also the need of some active incorporation of these materials into the soil in order to secure their full utilization.

The manure here has proved superior to the commercial fertilizer in three cases out of four. The average net gain throughout, however, is only about 10 bushels of fruit per acre annually and about two-thirds of an inch of increase in trunk-girth during the entire period. The real surprise, therefore, is in the fact that the present comparatively light application of commercial materials has so nearly equalled the 12-ton application of manure.

The cover crop here has shown a gain over its absence in two cases out of three, but the total net gain from it has averaged only 3.5 bushels per acre annually. It is difficult to account for this virtual failure of the cover crop to show important value, and even more difficult to account for the vacillation in superiority shown between tillage alone in the presence of manure and tillage and cover crops in the presence of commercial fertilization. Too much competition for moisture, which is needed by the trees at that same time, may partly

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account for the low average benefits derived from the cover-crops, but it is also probable that their actual plant-food addition is of less value to the trees than has been supposed.

The latter probability is indicated by the results of some extensive tests of green manuring made in the laboratory by J. W. White, of the Agronomy Department. In these tests in the case of red clover, for example, it appears that no appreciable increase of nitrogen appeared in the soil for four months after the clover had been turned under. The soil in this case was relatively heavy, which would tend to retard the rate of nitrification, and this process may also occur considerably more rapidly outdoors than in. But even if it occurred twice as rapidly in the field, the nitrogen from clover plowed under in the middle of May would not begin to be available until about the middle of July, and the new cover crop sown at that time would soon begin competing actively for this nitrogen as fast as it appeared. If this is the action that normally occurs in the average orchard soil of the heavier type, it is easy to see why the benefits from leguminous cover crops annually turned under, are usually relatively slight.

The crop value of the mulch in the present experiment has been rather high, ranging from 70 to 103 bushels per acre in the three cases involved. It requires about 3 tons per acre of plant materials annually to maintain a first-class mulch in mature orchards, however, and since practically equal results are being obtained from tillage and fertilization, it is evident that only relatively cheap materials, or those that can be grown between the trees, are likely to be really preferable where tillage is readily available.

The correlation between growth and fruiting is very striking here, especially in the fertilized sections. In those sections, the rank in yield is the same as that in growth in all cases but one pair, and a very slight change in yield would bring this pair into line. The correlation in the unfertilized section has been broken up somewhat this year by the unexpectedly low yield on the plat receiving tillage alone, while its growth continues high. This may be corrected by the yields of another year.

This experiment has also furnished some interesting data on the relation of blight to rate of tree growth. In the sod plat, for example, in which the growth rate, as shown in the table, is the lowest of any in the experiment, there has been practically no blight during the entire period, while in the adjacent plats, and especially in those receiving manure, the blight has often been very severe. The latter trees have been growing from 30 to 50 per cent faster. The slowest growth, however, is not always the most resistant, as some very weak and poorly nourished trees in other locations are often seriously attacked. In general, therefore, it appears from the data now available that it is the trees of intermediate growth — neither too much nor too little — that are most resistant to the twig and canker forms of blight. If this conclusion is fully confirmed by further observations, it should aid materially in the general control of this difficult disease, although no modification in growth rate will afford protection against the blossom blight except in so far as the general sources of infection are reduced.

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Results From a Mature Orchard.

The next group of results have been obtained in an orchard of Baldwin and Spy planted in 1873. The orchard is located in Wyoming County about 40 miles north of Wilkesbarre, on a light, sandy alluvial soil, technically known as Chenango fine sandy loam. This soil is unusually well supplied with moisture. The experiment involves six treatments, the results of which on yield and growth are shown in Table III.

TABLE III.—INFLUENCE OF CULTURAL METHODS ON YIELD AND GROWTH. (Fassett Orchard.)

	Average Annual Yields per Acre.			Average Increase in Trunk-Girth.
Treatment.	1908-12 bu.	1913-16 bu.	1908-16 bu.	1907-16 in.
Tillage and Cover crop.....	370.0	434.5	398.7	9.35
Mulch	302.4	476.8	379.9	6.84
Tillage, Cover crop & Manure	330.8	508.0	441.4	11.60
Mulch and Manure.....	453.6	653.0	542.2	8.51
Till., Cover crop & Fertilizer	322.6	677.2	480.2	11.32
Mulch and Fertilizer.....	390.8	607.2	487.0	9.08

Varieties — Baldwin and Soy planted in spring of 1873.

In this case, the tillage and cover crop treatment alone has done exceptionally well, especially during the first 5-year period. During this period it has excelled all other treatments in yield, except the mulched plats receiving fertilization. This period moreover omits the first year of the experiment. It appears therefore that if this experiment had been closed at the end of its 6th year, the natural conclusion would have been that the tillage and cover crop treatment alone was ample to maintain yields here and that the addition of any kind of fertilization to it was unnecessary and unprofitable. During the next 4-year period, however, this treatment has fallen to last place in yield, and although still actually high, it is now being surpassed by from 73 to 243 bushels per acre annually, in the tilled and fertilized treatments, and by similar margins in those receiving a mulch and fertilization.

This apparently indicates distinctly greater efficiency from the cover crops on the lighter and sandier soils, as might be expected from their more rapid rate of nitrification, but even here annual leguminous cover crops have not been sufficient to maintain the pace indefinitely with plats that are receiving regular fertilization. In the stimulation of growth, the tillage and cover crop treatments have been much superior to the mulched plats in all cases in the present orchard. This shows that those treatments are likely to be especially valuable in mature orchards wherever the growth is deficient. In the present case, however, the extra growth has served no useful purpose, as the trees were already full-sized, and the growth of the mulched trees seems to have been sufficient to secure full yields.

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In this experiment the fertilization has had the most influence on the untilled plats, so far as yields are concerned. The continued high yields on the mulched and fertilized plats, moreover, shows that it is entirely possible to maintain full yields in a mature orchard without any tillage, when so desired. As between the manure and fertilizer used here, there is very little difference in efficiency in either yield or growth, each of them excelling the other in one of the two cases involved.

Relation of Treatment to Annual Bearing.

The mere size of the yield over a given period, however, is only one phase of the problem. The steadiness or regularity of the yields is also of much importance, since this phase largely determines both the size of the thinning bills and the ability to remain on the market. The relation of the various treatments in the present experiment to this phase of the subject is shown in Table IV.

TABLE IV.—INFLUENCE OF CULTURAL TREATMENT ON STEADINESS OF YIELD.

(Yields in Bushels per Acre Annually, in Expt. 221, Fassett Orchard.)

Treatment.	1907.	1908.	1909.	1910.	1911.	1912.	1913*	1914.	1915.	1916.
	bu.	bu.	bu.	bu.	bu.	bu.	bu	bu.	bu.	bu.
Tillage and Cover Crop.	23	467	195	505	202	481	525	512	366	335
" Cover Crop and Manure	117	145	493	216	612	188	654	746	263	656
" Cover Crop and Ftlzr.	129	122	639	118	573	161	827	600	611	671
Mulch alone	29	221	215	391	246	439	527	438	439	503
Mulch and Manure.....	84	215	493	526	621	413	753	713	419	727
Mulch and Fertilizer...	38	199	409	560	370	416	693	539	534	663

*The 1913 yields are based on the Spy alone, since the Baldwins were seriously and irregularly affected by frost.

These figures show that some of the treatments have resulted in distinctly biennial bearing, as a rule, while others have given relatively steady and uniform yields. In general, the tillage treatments have given the former result, while the mulched plats, especially those receiving fertilization, have usually been very uniform. On the latter plats the yields have remained almost constantly between 400 and 700 bushels per acre for the last 8 years, although the varieties are Baldwin and Northern Spy.

From these and similar results in our other experiments, it appears to be entirely practicable to maintain relatively high and uniform yields in many orchards. To accomplish this, however, three requirements must usually be met. These requirements in general are, the prevention of excessive yields in any one year, by thinning or otherwise; the maintenance of an ample supply of plant-food and moisture; and the absence of any important injury to the roots

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by too deep tillage or other means. When these three conditions are steadily and faithfully met, fairly regular crops should be secured under any normal conditions.

Relative Value of Various Cover Crops.

Along with the experiment shown in Table I, another experiment was started in the same orchard to get some light on the relative value of the leading annual cover crops in promoting the growth and yield of young trees. The latter experiment included 12 annual covers with the usual tillage in the early part of the season, and one permanent cover, alfalfa, which was simply mowed about three times a season and the material largely used as a mulch around the trees. The results to the close of the 9th year are shown in Table V.

TABLE V.—INFLUENCE OF COVER CROPS ON GROWTH AND YIELD OF YOUNG APPLES.

(Expt. 383, College Experimental Orchard, 1908-16.)

Plat	Treatment.	Av. Gain in Girth in.	Gain over Lowest P. Ct.	Bloom 1916 P. Ct.	Total Yield lbs.	Growth Rank
1.	Med. Red Clover.....	12.19	11.2	25.3	336	7
2.	Mammoth Clover	11.46	4.6	7.8	60	10
3.	Alsike	11.06	0.9	4.2	92	12
4.	Crimson Clover.....	11.75	7.2	4.7	56	9
5.	Vetch	12.79	16.7	7.6	55	2
6.	Cowpeas (Black).....	10.96	0.0	5.9	73	13
7.	Soy Beans (Hollybrook)..	12.77	16.5	9.5	107	3
8.	Oats and Canada Peas....	12.40	13.1	17.0	140	4
9.	Rye	11.77	7.4	5.6	82	8
10.	Millet	12.24	11.7	14.0	257	6
11.	Rape and Turnips.....	11.12	1.5	2.6	22	11
12.	Buckwheat	12.27	12.0	8.8	72	5
13.	Alfalfa (Used as a mulch)	13.03	18.9	37.3	288	1

Here again it is evident that the mulched and untilled trees in the permanent alfalfa plat are still in the lead in nearly all respects. This position moreover has been attained without the aid of any materials from outside sources, excepting the necessary manure, lime and inoculation required to get the original alfalfa started. In fact the alfalfa has furnished all the mulch required and some surplus besides, especially in the earlier years. The mulch also has always been heavy enough to keep down most of the growth over the area containing the majority of the tree roots. This depth of mulch is probably desirable for best results with this plant because of the special affinity of growing alfalfa for both moisture and soil nitrogen.

There has also been no apparent damage from mice in the alfalfa section, and similar observations elsewhere have led to the impression that the alfalfa itself may furnish sufficient food so that the trees need not be molested. It

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would not be well to rely too much on this feature, but it is apparently prominent enough to attract attention. In a good soil, moreover, it is often possible to get an ample mulch and a considerable surplus of good hay besides. In other words it makes available a combined mulch and partial intercrop system, which is especially adapted to large acreages or to places where tillage and intercrops are not available.

Another interesting result in the present experiment is the relatively high rank of the buckwheat plat. It is probable also that this plant does not require the return of its grain to the soil in order to exert its usual good effects. The grain might, therefore, be harvested and simply the straw be returned to the soil, thus affording the unique example of a combined cover crop and intercrop, which is apparently not injurious to the trees.

Of the annual covers the vetch is in the lead in tree-growth, which is probably the fairest basis of comparison at present. This is not unexpected in view if its nitrogen-fixation, its shading growth habit, and its low moisture demands. This plant is also worthy of consideration as a semi-permanent cover and mulch producer. It usually matures its seed by the first of July or thereabouts, after which it can be cut and let lie for awhile for re-seeding. After it becomes well dried, the hay tedder can be run over it to shake out the seeds and the vetch straw can then be brought around the trees for a mulch. A light discing or harrowing after the raking may be helpful in increasing the germination for the next crop.

The soy beans, and the oats and peas have done very well on the present soil. The cowpeas, on the other hand, have apparently had a very poor influence on the associated trees. We are unable to give any very satisfactory explanation for this. Their greater moisture draft may be involved, or again they may not be well adapted to the heavy soil in this experiment. The millet, buckwheat, and rape when used alone, have done the best of any of the non-legumes. Their low seed cost also makes them worthy of special consideration.

General Cultural and Cropping Rotations.

In view of all the facts brought out in the experiments above, we would venture to suggest the general cultural and cropping rotations shown in Table VI, for use in apple orchards where conditions are suitable. To some extent this table brings together the practical suggestions from all those preceding:

TABLE VI.—CULTURAL AND CROPPING ROTATIONS FOR ORCHARDS.

Year.	Young Orchards	Mature Orchards.
1	Early Potatoes, followed by clover.	(a) Early tillage, followed by clover or vetch.
2.	Clover. Partly used for mulching trees.	Clover or vetch mulch (1 or 2 years).
3.	Early cabbage or corn, followed by winter cover or rye and vetch.	(b) Early tillage, followed by alfalfa.
4.	Beans, tomatoes or buckwheat.	Alfalfa, mulch (3 yrs. ±).

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These rotations provide for a logical succession of suitable intercrops, and also for a definite winter cover in all cases but one. This is in the winter following the 4th year of the young orchards, in which there will naturally be sore residue available from the crops used. The present scheme also permits a choice between special and general crops during the third and fourth years to suit local conditions. The rotation can be expanded by allowing the clover to remain more than one season, if so desired, and it can naturally be contracted by omission of any of the season's assignments.

In the mature orchard, two rotations are suggested. The first is most nearly in line with the present good practice. It involves less labor than the annual cover crop system, and it also will probably permit more of the legume nitrogen to reach the trees. Where it is desired to prolong the mulch period, this can often be done simply by moderate applications of acid phosphate and occasionally of lime, to maintain the clover or other legumes used. Where still longer mulch periods are desired, the alfalfa treatment is suggested, with the accompaniment of enough tillage to renew the cover and reduce the mouse infestation. Either of these plans if accompanied by proper fertilization for the trees, should prove very satisfactory.

DISCUSSION.

Question—How large of an area was the fertilizer applied?

Dr. Stewart—We fertilized the tree as a general proposition in all these applications, rather than attempting to fertilize both trees and inter-space. In the application of the fertilizer we began within about two feet of the trees and carried it out to about five or ten feet beyond the spread of the branches as a rule. As the tree becomes matured it generally means that the fertilizer is spread over nearly all the area. It is the same way with the mulches, we attempt to keep it mulched a little beyond the spread of the branches.

Question—Have you ever used lime alone in your orchard?

Dr. Stewart—Yes, we are using lime in another experiment in the same orchard, but the lime is only valuable in promoting the growth of leguminous crops between the trees and through them furnishing some nitrogen, but lime alone has not proved of any important value to the trees.

Question—How deep do you plow?

Dr. Stewart—We try to plow as shallow as we can, not over four inches deep, if possible. It is quite possible that in your sandy soils you might get better results from an active tillage treatment than from a mulch treatment. At the same time there is no doubt that if you can get enough mulch you can conserve moisture just as well as by the best of tillage, and save a lot of labor which is becoming difficult to get. But if you can't get the mulch, by all means follow the tillage treatment. In the case of peaches the present indications are that it is generally impossible to get the mulch, owing to the closeness of the trees.

Question—What depth mulch do you mean?

Dr. Stewart—We have tried to obtain a mulch sufficiently deep to keep down practically all the grass growth immediately under it. In other words, it

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is a real mulch that we are using and not a mulch by name only. I believe we have put on more mulch than is really necessary in some cases, however, and have thus made it too favorable for mice, and I am inclined to think that we might well have reduced the amount of mulch considerably.

Question—How many times do you cut a year?

Dr. Stewart—In alfalfa, three times, in other cases, we cut twice a year.

Question—How much alfalfa per acre?

Dr. Stewart—Fully three tons to an acre.

Question—How does the amount of dry matter in the manure compare with the matter in mulch?

Dr. Stewart—We are putting on twelve tons of manure to an acre as you commonly obtain it.

Question—What percentage of water in the manure?

Dr. Stewart—That varies. In my opinion six or eight tons of manure as it is usually obtained is an abundance for an ordinary orchard.

Question—Does saw dust in manure interfere with the intercrops?

Dr. Stewart—Not at all.

Question—What effect does the mulch have on fungus diseases?

Dr. Stewart—We have not noticed any great difference between the mulched and cultivated plats, but have noticed some difference in insect trouble, and particularly in connection with the late fall foliage-eating caterpillars, such as red-humped, yellow necked datana, etc.

Question—What would you do with your mulch system in case of an attack of a leaf miner; also in case of scab?

Dr. Stewart—It is quite possible that if you are having considerable difficulty from those two things the mulch treatment might be less satisfactory.

Question—Does that type of orchard land such as they have in Winchester, Virginia, run up through Pennsylvania?

Dr. Stewart—Yes, it is much the same in the Cumberland Valley.

Question—How does the heavy nitrate fertilizer affect the color?

Dr. Stewart—It reduces it, but this can be overcome in many cases by later picking.

Question—What varieties on the Eastern Shore of Maryland and Delaware are most susceptible to blight?

Dr. Stewart—I should say that the York Imperial, Yellow Transparent and Jonathan are probably the most susceptible. The Smith Cider also is very susceptible.

Question—How about the Stark?

Dr. Stewart—It has not been particularly susceptible, and the Stayman Winesap has not been particularly susceptible, in my observation.

Question—Would you advise pruning blighted trees?

Dr. Stewart—I certainly would.

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MORE ABOUT SOD MULCH VS. CLEAN TILLAGE.

BY H. P. GOULD, U. S. DEPT. OF AGRICULTURE.

As you hear the title of my paper you are probably asking yourselves whether there can possibly be anything more to say about a subject that has been discussed so long and so persistently as has this matter of sod mulch vs. clean tillage in orchard management.

For one to attempt to say anything about the matter may be like digging up dry bones of the past. I have sometimes wondered whether the time was not at hand when the discussion of routine cultural practices might well disappear very largely, from most horticultural society programs and thus give place to other problems that are now more acute.

It may be observed in passing that there has been a rather marked change during the past 20 years in the make-up of the average horticultural meeting program. When I first began to attend such meetings the papers presented had to do largely with the details of orchard cultivation, and the advisability of spraying to control insect pests and fungus diseases. Then the San Jose scale for a few years had right of way and dominated everything else. More recently questions of handling, storing and marketing have come to the fore as the "paramount issue."

But the manufacturers continue to compound new spray materials. New insects compete — in part at least — fortunately not yet with entire success — for the attention formerly given to the San Jose scale.

The chemist, the soil physicist, the biologist, the bacteriologist and a variety of other 'ologists have all been very busy — especially so in recent years — and as a result new conceptions of soil fertility are formed and with them come new problems in the practical features of soil management.

Thus the old problems of spraying, tillage, soil management, etc., keep reappearing, though perhaps in a slightly altered form, and with new meaning.

So much in the way of an apology for bringing up again an old subject that previously has been considered with all the pros and cons that could be enumerated. And yet the subject, if settled, does not seem to stay settled. It keeps coming up in one form or another. Now it is through the pen of some facile writer in a horticultural paper who gives a convincing story of the remarkable performance of an apple orchard that is maintained under the sod mulch plan, and the credulous reader is lead to believe that a sod mulch in an orchard is the thing!

Then comes a story of some worthless, unproductive orchard that has been in sod for years and which responds with an abundant profit when plowed and cultivated and otherwise given a chance, and to the reader who wants to know the truth it begins to seem that tillage, after all, is what an orchard needs.

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Then comes along an experiment station bulletin in which are described well-planned and carefully executed experiments, the results of which declare for tillage, with some of its variations, for high yields and large profits. Or it may be still another bulletin reporting on investigational work that shows the best growth of tree, the highest yield and the finest fruit where some form of mulching has been followed.

Another phase of what is substantially the same problem is the use of fertilizers in orchards, and in this direction we have the evidence that orchards do not need fertilizers, arrayed against the apparent fact that their use produces marvelous results; and again, that phosphoric acid, or potash, or maybe a complete fertilizer produces a striking response, and yet again, nitrogen may do as much as all the rest combined.

And so this enumeration might go on indefinitely, recounting one piece of conflicting evidence after another in favor of this system and opposed to that, and then all the way back again in the opposite direction!

I said "conflicting evidence," but here I would make a correction. I do not think the evidence is conflicting in itself. It is only the manner in which it has been presented that makes it appear to conflict. Perhaps as a rule, the original discussions of experimental work have been complete and the results fully interpreted. But when made the basis of popular articles the fragmentary presentation of the work has omitted the fundamental teachings which alone are of real importance.

In my judgment much that has been written in recent years about the sod mulch method, the tillage system, and the use of this fertilizer and that one has stopped short of the mark. It has too often presented empirical facts regarding sod mulch as if there was real virtue in the method itself; the tillage of orchards has been discussed as if, quite apart from every other consideration that operation had some sort of magic charm within its power to make a tree yield fruit. If, in some orchard a particular fertilizer has given a profitable increase in yield and quality of product, the impression has too often been conveyed that the same fertilizer must perforce be equally effective in every other orchard. In other words, isolated instances and individual facts have often been presented without much consideration for the underlying principles that are involved and with little effort to properly correlate cause and effect.

Having thus stated my thesis, I wish to affirm that there is just one point I desire to make in all that I shall say at this time. I should state also that I do not advocate any particular system of soil management, for the sake of the system, neither do I preach the use of any particular fertilizer, nor the practice of any particular method of pruning, nor anything else in orchard management for the sake of the thing itself. The measure of the thing is what it does regardless of the system, method, or practice which it represents, nor am I concerned as to whether a particular practice is orthodox or heterodox!

The man credited with being wiser than any other said: "Wisdom is the principal thing; therefore get wisdom." In terms of present day fruit growing parlance it may do this sage advice no injustice to paraphrase it and say: "Apples are the principal thing; therefore get apples." In any event, the primary function

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of any apple orchard is to grow apples; and of a peach orchard, to grow peaches. It is true that these functions are sometimes perverted to other uses, but that is not the fault of the orchard.

The best fruit grower may be described as the one who so manages his orchard that it produces the largest crops of the best fruit with the greatest degree of regularity, and with the least proportionated expense. A grower who meets all of these superlatives cannot be a slave to any particular system nor can he permit himself to be ruled by conditions, except in the smallest possible degree. On the other hand, he must take advantage of conditions and in the largest possible degree make them what he wants them to be. He must manage his orchard on the basis of fundamental principles rather than by any empirical rules.

You ask what all this has to do with the question of "sod mulch vs. tillage." The connection is not far to seek. If an orchard is making its best possible record under a sod mulch system of management, it is because the soil conditions most favorable to tree and fruit development are best promoted under the influence that accompany the sod mulch. And again, if an orchard long in sod makes its greatest gains following the adoption of some system of tillage it means simply that the optimum soil conditions for tree and fruit growth are brought about under existing conditions by the influences of the tillage methods applied, and all is perfect peace and harmony there is no conflict of evidence nor violation of any principles in the fact that the two orchards give their best response to methods of soil management more or less opposed to each other in their theoretical effects upon soil conditions.

I digress here to say that these terms "tillage," "mulch" and "sod mulch" are used commonly with the greatest abandon as to what they actually mean — or should mean. We have good tillage and bad; to one grower tillage means plowing the orchard in the spring and perhaps harrowing it once or twice later on, or may be not at all; to another it means 20 or 30 cultivations during the season. We have good mulching and bad. We have the sod mulch for the sake of the trees and the fruit crop and we have the sod mulch for the sake of the hay that can be hauled from the orchard. Nor every apple grower is disposed to haul alfalfa hay into his orchard to be used as a mulch as one of the leading exponents of the sod mulch system is reported to have done. These terms need some sort of standardization!

Once more, when one orchard responds notably to nitrogen or potash or to the application of some other kind of plant food, and another orchard does not respond to them it does not indicate that the trees are playing tricks nor that they don't know how to grow.

What it probably dooes mean is that some kind of plant food is lacking in the one soil and is limiting crop production, while in the other soil it is a lack of some other food element that is limiting the crop.

It comes down to the matter of what plant food is, or is not available in the soil for the use of the trees. As plant foods in different soils vary so does the response of plants growing in them vary.

When the food that is so lacking that it is limiting tree growth and crop production is supplied in sufficient quantity the tree responds, other things being equal, as naturally as sunrise follows sunset. And here it may be said that to apply

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(b) A system that gives optimum results for a time may not continue always to be the best system;

(c) A system is good or bad, not as a system, but on the basis only of the results it produces; therefore sod mulch or tillage, as the case may be, is good or bad depending on the results; and the results differ widely under different conditions.

(d) The definite relationship of cause and effect, in orchard management; if one system of management proves to be superior in its effects to another it is because the conditions which it promotes for the time being, at least, best meet the requirements for tree growth and fruit production;

(e) The conditions may so vary in different orchards that the best results follow the use of systems and methods that are quite opposed to one another in their general aspects;

(f) And finally, the only way in which the value of a particular method or practice or system in a certain orchard can be definitely determined is to make an actual test in that orchard of it.

If I have made my point clear, there is little more for me to say in this connection, though there are one or two others phases of the sod mulch question that I want to touch upon very briefly. They are not with regard to whether one system is good or bad in comparison with some other system, but rather with regard to whether it is the most practical under certain conditions without reference to other methods. For instance, there is much land in some sections of the country admirably located for orchard purposes, especially for the growing of apples. Because of its topography, or for other reasons it must remain in sod. Tillage, however desirable, is quite out of the question. Yet under some mulch system good fruit can be grown and made to yield a larger profit than can be secured from the land in any other way. It may therefore be good business to grow apples under a mulch system, even though tillage, if possible to give it, would result in larger returns. It comes back once more to common sense and good business.

Another phase is represented by conditions that are now being forced to the attention of the fruit growers in the Northwest. For years they have been giving their orchards clean cultivation without cover crops. As might be expected, the soil in many of the orchards is now showing the effects of the loss of humus.

Many of the growers in that part of the country have practically all their land in orchard. There is sore need of diversification.

Irrigation is practiced in most of the fruit growing sections and alfalfa seems to do well. A good many growers are now putting alfalfa in their orchards and thus adopting in effect a sod mulch system. This practice is too recent to show whether or not it is economical and effective. But the economics of this method and its effectiveness is not necessarily measured entirely by the response of the orchard in terms of the fruit.

The use of alfalfa admits of making hay from a portion of the cuttings and using the others as mulch in the orchard. The advocate of tillage and the one who has seen his sod orchard respond magnificently when given cultivation naturally abhors the thought of taking a crop of hay from his orchard, and well he may, for under his conditions experience teaches that it is disastrous. But if under other

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conditions in another region, for a few years an apple grower can also grow alfalfa in his orchard and without any serious detriment to the trees, and can sell annually a ton or two per acre of alfalfa hay, or feed it on his place, he may actually have a large net profit from his land even though there may be, perhaps, a slight reduction in the fruit crop. Again, it is a matter of good business.

Another factor of this same problem is the relative cost of maintaining an orchard under a mulch system and under tillage. It is commonly conceded that tillage is the more expensive method of maintenance, except possibly where large quantities of mulch have to be purchased. Unless the returns are enough larger to more than pay the costs of the more expensive method it is not good business to follow the more costly practice. Conversely, if for a period of years an orchard can be so maintained under a less expensive mulch method that the trees retain all their inherent strength and vigor and still produce abundant crops of good fruit, it may easily be that the saving in production costs will more than equal the loss in profits from the fruit due to the method used.

The real problem, then, as I see it, is to discover the method, changing it from time to time as necessary, that will maintain the full vigor, thrift and productiveness of the trees and the quality of the fruit and which when all the bills are paid, will represent the largest profit from the land. And this is the point I started out to emphasize. A very simple one it is. It is not enough for a fruit grower to know that a particular system of soil management, or the use of some fertilizer in somebody's orchard is giving optimum results in order that he may know just what to do in his own orchard. Effective systems used by his fellow orchardist ought to set a fruit grower to thinking and studying and to comparing his conditions with those in the other orchard. The methods and their results may be suggestive, and helpful in that they are suggestive, but a grower cannot safely reason that because a particular thing is good in somebody's orchard it is necessarily good in his. He should aim to discover why it is good and then apply the principle in his own orchard.

While I am an advocate of no special method, I believe that for most bearing orchards, in most sections, and under most soil conditions, the "yard stick" by which other systems are measured is a system of thorough tillage, supplemented with suitable cover or green manure crops to supply humus, and by such applications of plant food as experience proves is needed, because I am convinced that such a system in the long run results in larger crops of better fruit, borne with greater regularity and with less proportionate expense than other systems in the majority of orchards. On the other hand, I am also convinced that some system of mulching has a larger place in orcharding, particularly in growing apples, than we have sometimes been inclined to believe.

Investigations have shown that as a general proposition the well-drained soils that have high moisture content are more productive than similar soils having a lower moisture content, other things being equal. In orchard practice under some soil conditions, mulching has conserved moisture better than tillage. In other cases tillage has been the better conserver of soil moisture. So far as results can be correlated there appears to be a rather close connection between root development and the amount of aeration the soil receives; in other words, the amount of oxygen that penetrates it, or the amount of air passing through it.

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It is a theory that the very shallow rooting habits of some kinds of plants are due to the large supply of oxygen that they require, the requisite amount being available only near the surface of the soil.

If the optimum supply of oxygen required by the roots of apple and other fruit trees has narrower margins than have been realized, then the fact may have something to do with the tillage mulch question. As a general proposition it is probably true that a soil kept loose by tillage is better aerated than a more compact soil that is in sod. But perhaps with some soils there may be such a thing as too much aeration for optimum results.

Again cultivated soils sometimes, perhaps generally, have a higher temperature in the upper strata than do soils in sod under otherwise similar conditions; and I think habitually higher than where there is a mulch.

The temperature of the soil is also affected by its moisture content, its moisture content is affected by its supply of humus; the supply of humus may be modified by tillage and by the various systems of mulching. And in turn, all of these factors are endlessly concerned one with another in making a soil more or less fertile and in making plants grow more or less well. As there are certain soil temperatures which are favorable to chemical and bacteriological activities, so the temperature is important in other respects. The rate at which solids enter into solution in water is influenced by its temperature, as a rule the higher the temperature the more rapid they enter into solution; also the larger the quantity dissolved. Applied to soils, other things being equal, the higher the temperature, the greater the quantity of plant food that is dissolved in the soil moisture. And it is in such solution that the plant foods in the soil are taken up by the plant.

Probably also there is a soil temperature that is optimum for the best and most rapid action of the roots, that at a certain temperature or within a certain range, the roots will take up plant food in solution at the most effective rate, and above which, or below which the action of the roots is retarded.

So I might go on citing these interrelationships of soil conditions as factors in the complex problem of why one soil is productive and another is not; why one orchard does its best under some particular type of soil management and another responds best to a type of soil management that is radically different.

If I have made any clearer the character of the problem that is involved in the management of orchard soils and the fact that its solution rests on the application of fundamental principles, and not on the use of empirical evidence; if I have emphasized to any effect the notion that certain optimum combinations of soil factors are necessary to bring about the best results with an orchard and that those conditions may be best produced by one kind of soil treatment in one case and perhaps some other treatment in another — if I have accomplished these things — I have reached the point at which I aimed in the beginning.

It is for the individual fruit grower to discover what the optimum soil conditions in his own orchard are and then adopt the methods of management that will best produce those conditions. In this, the results of all the experimental work that has been done are most valuable; the experience of other fruit growers is of the greatest assistance. By them on the one hand the great fact of fundamental differences is emphasized and on the other they point the way by which every fruit grower may see the light with reference to his own orchard.

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REPORT OF COMMITTEE ON PEARS.

WALTER B. HARRIS,

Worton, Md.

The bureau of Crop Estimates tells us that Germany in 1913 had 22,000,000 bearing pear trees, the greatest number of any country in the world. The United States comes second with 15,000,000, in 1910, and Japan third with 8,000,000 in 1914.

There are only five states in this country with more bearing pear trees than the Maryland-Delaware Peninsula. New York comes first with 2,000,000; California second with 1,400,000; Michigan next with 1,100,000; Ohio 900,000; Illinois, 786,000, and our Peninsula comes next with 750,000. Of this number Delaware has 450,000, and the Eastern Shore of Maryland, 300,000. There are no commercial orchards on the Eastern Shore of Virginia, although Mr. E. L. Elzey tells us that in Northampton County there are pear trees over 100 years old producing crops of fruit nearly every year.

The leading pear county on the Peninsula is Kent County, Delaware, with 320,000 bearing pear trees. Kent County, Maryland, comes next with 172,000 bearing pear trees.

I might mention the fact that we have more pear trees than apple trees on the Peninsula, and I believe the pear is worthy of more attention than we have been giving it.

The crop for 1916 was 61.8 per cent of a full crop compared with 65.1 per cent the average for the past ten years. Pears have sold higher this year than for several years.

Letters have been received by your Committee in answer to our inquiries from which the following extracts are taken:

"I suppose there are about 100,000 pear trees in Kent County, Maryland, mostly Keiffers. The canners took ninety per cent. of the crop at twenty to twenty-two cents per basket, few paying as high as twenty-five cents. The buyers took the balance of the crop at the same price.

"L. W. BURRELL, County Agent,
"Chestertown, Md."

"The number of Keiffer pear trees in Delaware is many times larger than all other varieties put together. In fact, there is scarcely a man in the State who has a commercial orchard of any other variety. There are more trees in Kent County than in both of the others. The greater portion of the pears are shipped out of the State to be canned elsewhere, only a few going to cold storage, and only a few canners in Delaware put them up. Blight has been

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severe in Delaware for the last two years, but no worse than it was several years ago. The blight of pears in the State is not increasing to any extent.

"WESLEY WEBB,
"Dover, Delaware."

"Pears are blighting worse each year, and I shall not set any more. My fruit is usually sold at the Station before I commence to pick.

"J. M. REED,
"Frederica, Delaware."

"I do not know of any section of Maryland where much attempt is being made on growing this fruit on anything like a commercial scale, excepting your own County. Of course, there are some scattered orchards throughout the State, but in most instances they are not being given modern up-to-date culture, and any fruit that may be produced is handled as a small side issue.

"PROF. S. B. SHAW,
"College Park, Md."

"I know that there is a feeling among some of the growers that now is the time to plant pears. The blight is a very serious drawback. We will probably have to come to the same position of the peach growers in relation to the yellows, figure on a certain percentage of loss and go right ahead with it. I am informed by Prof. E. P. Weldon that California is waging a vigorous fight against the disease, and evidently they are getting results. He tells me that one of the largest pear growers spent $11,000 in one year fighting the blight. He has about 300 acres in bearing and three years ago when the blight was especially prevalent he had at one time 40 and 50 men cutting out blight. He finds it necessary to fight the disease in the roots and trunks as well as in the smaller branches. The work below ground necessitates excavating about the trees, and occasionally a man will spend two days or more in removing portions from the trunk and root system of a pear tree. Apparently our Maryland growers could afford to spend a little more than they do in controlling this trouble. Our pathologists tell us that it would be sufficient if all the active cankers in the orchards and nearby vicinity could be cut out before the insects had an opportunity to spread the bacteria in the spring. Then by maintaining a slow, hard growth to check the susceptibility of the trees, a profit might still be made.

"As to the breeding work with pears at this Station there is little as yet to report in the way of definite results. The pear seedlings are very tardy in reaching the bearing stage and many of the seedlings themselves have succumbed to blight and other troubles. However, I have about 800 individuals which show a wide variation in tree characters, and no doubt will show an equal variation in the fruit when they come into bearing. These are mostly crosses of Keiffer, with Seckel, Duchess and Anjou, with various other combinations in varying numbers. The few which have fruited so far have not shown any great promise, although one or two have shown indications which point to the possibility of securing some desirable sorts from the above combina-

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tions. I am hoping that the next two years will see quite a number of these seedlings coming into fruit, and I can then have something more definite to report.

"The work with apples has been much more successful so far in that more than two hundred individuals have fruited and I have selected out about a dozen for propagation in order to test them under varying conditions. I have been able to force some of them into fruit by girdling, but this method seems to work rather disastrously with pears, so it looks as though I shall have to wait their own good time. When the demand becomes strong enough horticulturists will go after the proposition in a more definite way and varieties of merit will be developed which are suited to conditions as surely as they have done with other fruits. It is just a little more discouraging than with some of the other fruits, but it is bound to come. There are a few little known varities such as Crocker, Rossney, Comice, Douglas and possibly Lincoln (of Illinois) which should be tested out more fully in the East. We have young trees growing of a few new varieties, but they have not yet fruited and so cannot report on them. The pear is too good a fruit to be neglected, and I shall welcome a revival of interest in this essentially dessert fruit.

"Our Station farm is ill adapted to fruit growing, so that we have been somewhat handicapped in doing all that should be done in the way of testing out new varieties. I should be glad to co-operate with any of the growers who desire to test out some of the varieties under their own conditions. Possibly I could help out with suggestive lists and indicate where trees might be secured.

"W. R. BALLARD,
"College Park, Md."

The closing letter from Dr. M. B. Waite deals with the control of the pear blight, and is of special interest.

The past record of pear blight as far as the Peninsula in concerned, and this would apply generally to the older eastern sections of the country, is that the disease has been with us for at least one hundred years. The experience in the newer western sections, beginning with Ohio, Indiana, Illinois, etc., and extending to Kansas, Colorado, Utah, and Idaho, and finally to the Pacific Coast, California, Washington, and Oregon, is that pear blight permitted these new fruit districts to develop and in many cases to prosper for years, and then finally the germs reached the locality and the disease spread with even greater severity than in the eastern sections. In your Peninsula and in general over the Eastern States pear blight has been notable on account of its erratic behavior. This is particularly true of the apple, but applies to some extent to the more resistant pears as well. It is almost always present in greater or lesser amounts on the tender pears, such as Bartlett, Clapp's Favorite, etc., but it lets the apples alone or goes lightly on them for considerable periods of years, sometimes as much as ten years or more. Then a great outbreak occurs, the disease assuming an epidemic form and all pomaceous fruits, including apples, suffer severely.

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Of course, the behavior of different varieties is very pronounced. Some of the tender varieties as far as blight is concerned, like the Yellow Transparent, particularly young orchards the first few years in bearing, are likely to have more or less blight every year or in the lesser outbreaks just as do the tender pears. The feature of the great outbreaks, like the one beginning in 1914, which has lasted during the past three seasons, is that they attack the blossoms of most varieties of apples, including the more resistant kinds. These outbreaks vary considerably in their duration from one to three or perhaps more years. They vary in different sections. For example, the outbreak of the last three years has not been equally bad in all localities. Some sections which partially escaped in 1914 were very bad in 1915, and some which were bad in 1915 were much less affected during the past season. From all past records of pear blight we should expect this present great epidemic to subside very decidedly next year, though, of course, predictions of this sort are more or less risky.

There has been no such outbreak as this present one since the great outbreak of 1900 and 1901.* This was very severe from Virginia to Pennsylvania, blighting a very large proportion of the apple blossom clusters. There are many great outbreaks of pear blight recorded in horticultural history. Usually, however, they occupied territory of not more than two or three States. For instance, there was one in Ohio and Indiana in 1844. This is perhaps the first example of a great outbreak recorded in horticultural writings.

I do not know that I can point out examples of absolute control except temporarily. It might interest you to know that one of the first men on the Peninsula to take up our methods and put them in practice was Col. Robert Emory, of Chestertown, who went through at least two pretty severe outbreaks since 1895, when the present methods of eradicating the holdover blight began to be developed. One year I know he hauled out wagonloads of brush from his orchards. I saw the orchard one August when it was practically, if not absolutely, free from the disease. I think it must be admitted that complete success in controlling the disease in vigorous, well-cared for pear orchards usually means a combination of good work on the part of the grower and favorable natural conditions. It is very difficult to secure absolute control in the orchard when you are facing an outbreak. It is rather easy on the other hand, by good work when the blight is naturally dying out and declining. The fact that bees and other insects may carry in the blight anew during the blossoming period always interferes with the work and makes complete control extremely difficult. Commercial control and the securing of good crops of fruit has been done on both pears and apples in many different sections of the country. In spite of the great outbreak in California, beginning about 1903 and 1904 and extending vigorously in 1905, 1906, and 1907 and during which about one-third of the pear orchards of California were lost, it should be noted that during the past season California shipped an exceptionally large crop of Bartlett pears. The Medford, Oregon, district has maintained its pear industry in very good shape in vigorous, thrifty orchards in spite of the outbreaks of blight since 1907.

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PEAR BLIGHT.

C. A. McCUE.

The discussion upon nearly every paper that has been presented so far to this meeting has in some way turned to the subject of pear blight. After so much discussion it does not seem as though there was much of this subject left for me to talk about.

Pear blight, or to call it by the more general term "fire blight," is to be found throughout the State of Delaware, and I suppose that it is generally prevalent throughout Maryland. One phase of the trouble that has not been touched upon in previous discussions here, is its occurrence upon the crowns of seven or eight-year-old apple trees. For a few years back many fruit growers have had the experience of having many of their best apple trees die rather suddenly. When these trees are examined the roots are almost invariably found to be dead. I recall being in an eight-year-old orchard of Williams last spring. Several of the trees were dead and others were apparently dying. The trees were just reaching a profitable age and would have borne a barrel or more of apples per tree. Upon examination the roots were found to be dead or decaying. Upon further examination the pear blight organism was found in great abundance in the tissues of the dying roots. In my mind this root killing is one of the most serious phases of the pear blight disease that the fruit growers of this State have to face. The body blight, twig blight and blossom blight flaunt themselves before our eyes; but this attack at the crown of the tree is like a thief in the night, and its attacks are so insidious that we do not realize its presence until the damage is done. The first suspicion that we have that things are not all right is about blooming time when the tree begins to sicken, and its appearance grows gradually worse until the tree dies about the middle of the summer.

When a young tree sets an abnormal number of fruit buds and blossoms entirely too heavily for its age, it is a pretty good sign that something is wrong at the roots of the tree. During the past season I have discovered many such diseased trees simply by the fact that they were over bearing. Sometimes if the trouble is found in time the disease may be cut out and the tree saved; but usually the case is hopeless. Care should be exercised to see that the crown of the trees are not injured by tools in cultivating the orchard. It is also quite probable that many cases of infection have occurred through the organism working its way down suckers that spring up about the crowns of young apple trees.

Another serious phase of pear blight is the so-called blossom blight. It is not often that this form of the blight seriously endangers the life of the tree.

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The disease seldom does more than kill the bloom, or at most the spurs. This of course, ruins the apple crop for the year, and if the spur is killed the bearing capacity of the tree is greatly lessened for several years to come.

There is no contradicting the fact that the blight organism is carried to the blossoms by the bees, and other insects that may be in search of pollen and nectar. Also there is no contradicting the fact that we need the bees for the pollination and fertilization of the apple bloom. Hence we find ourselves perched upon the two horns of a dilemma. If we have no bees we have no blossom blight, neither do we have prospects for very much fruit. What are we to do? We must have the bees and we don't want the blight. One of the first suggestions that I have to make is to get rid of all the blighted pear trees in the vicinity of the orchard. The pear usually carries the blight organism over winter in what are called hold-over cankers. In only a few cases, as compared to the pear, does the apple tree possess these hold-over blight cankers. Strike at the root of the trouble and do away with the pears.

There is no doubt in my mind that spraying with Bordeaux mixture at blossoming time will quite largely control blossom blight. However, there are several things to look at in advocating any spray at the time the trees are in full bloom. If we put no poison in the spray at blossoming time, we would most likely have to spray again within a very few days in order to control coddling moth. If we do put a poison in the blossom spray we may kill a great many of the bees. This difficulty, however, may be more fancied than real. However, to be on the safe side we would have to spray with Bordeaux alone, this necessitates another spray within a week or ten days, which, in many cases, would be an impossibility to do. I do not know if lime sulphur could be substituted for Bordeaux; but I am inclined to believe that it could. Another point to be considered is "What effect will spraying in bloom with Bordeaux have upon the set of fruit." That is, would a drop of Bordeaux mixture placed directly upon the stigma of the blossom kill the essential parts of the flower. Upon this point we have but little light. There are only three experiments that I know of that will throw light upon this subject and two of them have never been published. Up in the Hudson River Valley a few years ago, many cherry growers found the set of fruit decreasing at an alarming rate, although they apparently had plenty of bloom. It was found that the trouble came from the dust of the cement mills located nearby. The dust settled upon the stigmas of the flowers and made the stigmatic fluid so alkaline that pollen would not germinate in it. We might naturally expect a similar result if we placed a drop of alkaline Bordeaux mixture upon the stigma of the apple blossom. Hence the danger of lessening the set of fruit by spraying in bloom with Bordeaux mixture.

Only a couple of weeks ago one of the men in the Illinois Experiment Station told me that last spring the University deliberately attempted to prevent the setting of fruit upon an old apple orchard by giving it a heavy spraying with Bordeaux when it was in full bloom. The result was that the orchard set the greatest crop of apples that it ever had.

In the spring of 1907 I tried spraying Bartlett Pears while in bloom with the idea of controlling blossom blight and spur infection. In 1906 I had acci-

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dently sprayed two Howell pear trees while in bloom, and as a result had no blossom blight and had a much larger crop of pears than off the trees that were not sprayed. So I determined to try the treatment out on Bartlett at the first opportunity.

Mr. S. H. Derby, of Woodside, kindly offered me a few Bartlett pear trees to work upon.

Nine trees were selected for the work and the number of blossoms and the number of fruit spurs in bloom were counted upon each tree.

These counts were made April 26, 1907, with the following results. Trees were in full bloom.

Tree No.	No. of Blossoms.	No. of Spurs.
1	731	143
2	459	89
3	284	47
4	733	130
5	214	46
	2421	455
6	223	34
7	113	19
8	1781	321
9	4495	633
	6612	1007

On the afternoon of April 26th, trees Nos. 1, 2, 3, 4, and 5, were sprayed with a 4-6-50 formula of Bordeaux Mixture. Nos. 6, 7, 8 and 9 were left as checks.

On May 18, 1907, notes were taken upon blight infection and the number of fruit set and dropped.

May 18. No. Tree.	Sprayed trees. No. fruits set.	No. of fruits set and fallen.	Blight.
1	77	3	1 spur.
2	28	0	0
3	35	2	0
4	44	0	0
5	13	0	0
	197	5	1
		Check Trees.	
6	52	0	4
7	12	0	0
8	265	111	0
9	584	301	0
	913	412	4

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Sprayed Trees. Notes. July 18.

Tree No.	No. Fruits on Tree.	Condition of tree as regards blight.
1	5	6 twigs affected and 1 spur.
2	1	2 twigs affected and 1 spur.
3	3	Clean.
4	8	1 blossom infected. 2 twigs from old canker, 5 twigs new infection.
5	3	Clean.
	14	

Check Trees.

6	24	4 spur infections, all from blossom.
7	0	Clean.
9	40 + 5 blighted.	19 spur infections and 9 cases twig infection.
9	99	61 cases of blossom infection and 52 cases brought about by other means.
	163	

Total No. of blossoms on sprayed trees.....2421
Total No. of spurs on sprayed trees..... 455
Total No. of blossoms on unsprayed trees.....6618
Total No. of spurs on unsprayed trees.....1007

Ave. No. blossoms per spur sprayed trees..... 5.3
Ave. No. blossoms per spur unsprayed trees..... 6.5
Ave. No. of blossoms per spur all trees..... 6.2

Total No. of fruits set on sprayed trees..... 197
Total No. of fruits set on unsprayed trees..... 913
Percent of blossoms set fruit sprayed trees..... 8.14 per cent
Percent of blossoms set fruit unsprayed trees..... 13.8 per cent
Set of fruit in favor of unsprayed trees..... 4.66 per cent
Total No. of fruits grown to maturity on sprayed trees..... 20
Total No. of fruits grown to maturity on unsprayed trees..... 168
Percent of fruits matured based on No. of blossoms, sprayed trees ..... .83 per cent
Percent of fruits matured based on No. of blossoms, unsprayed trees ..... 2.56 per cent
Percent of gain for unsprayed fruits..... 1.74 per cent

Conclusion:—Serious injury may be done to set of fruit by spraying in bloom.

July 18.
No. of blossom infections of blight on sprayed trees..... 2
No. of blossom infections of blight on unsprayed trees..... 84

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Per cent spur infection based on number of spurs.

Sprayed trees	.44 per cent
Unsprayed trees	8.34 per cent
Gain for sprayed trees	7.90 per cent

Conclusion:—There seems to be some protection against spur blight in spraying in bloom.

I have never followed this work up, but it looks as though there is a possibility of controlling blossom blight without too serious a danger to set of fruit by spraying in bloom with Bordeaux mixture.

There is still left the important question as to whether or not it pays to cut out blight in the summer time. I am on the fence as regarding the desirability of summer cutting on apple trees. I rather doubt that it is a feasible method of procedure for the average grower. The ordinary workman has not enough judgment and is more likely to spread the disease from tree to tree than he is to eradicate the disease. On old trees I am convinced that there is much merit in the practice of cutting out hold-over blight cankers in the winter. As a rule I would think that one good day's work in the winter was of more value than a week's work in the summer, as far as eradicating blight is concerned.

QUESTIONS.

What do you think of spraying pear trees with oil for the blight?

Prof. McCue—I never have tried it.

Member—I have four seckel pears and I cut the blight out and bought some spraying oil, and I gave them a dose of that, then in the spring I sprayed with lime and sulphur, and I have never had any trouble until this year.

Member—Don't you think you could reduce the alkaline in the Bordeaux mixture?

Prof. McCue—Yes, reduce the amount of lime.

W. T. Massey—Did you ever take into consideration the congeniality between the stock and the scion? I look on it as a human family. If the human family is not congenial there are separations and divorces.

Prof. McCue—There are two things to be considered. First, mechanical union, and second, congeniality of stock and scion. The trouble usually comes with overgrown or undergrown stocks. If the stock does not grow as fast as the scion we are going to get a weak union.

Mr. Walker—Mr. President, while we have nothing on the program just at present, I would like to hear from my friend from Sussex County, whom I have been meeting at the sessions of the Horticultural Society for about twenty-five years, I refer to Mr. Barker.

Mr. Charles Barker—It is true that I have been attending the meetings of this Society for more than twenty-five years, and the associations have been extremely pleasant. I am reminded of many changes, and my own method of life and my outlook have changed. Instead of buying more land I am now selling land and taking a less active interest in all practical matters of horticulture. I came to this meeting with the determination that I would let the young people do the talking, for I have had my say in the meetings of other years.

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THE MARYLAND APPLE GRADING AND PACKING LAW.

PROFESSOR S. B. SHAW.

During recent years there has been a decided increase in the planting of apples in Maryland. Adaptable soil and climatic conditions, nearness to markets, the success attending the efforts of our more progressive growers, and a general realization on the part of the people that the Blue Ridge section offers unusual opportunities for the production of this fruit, have, to a great extent, brought about this development. When these additional plantings come into full bearing the State's production of apples will be practically doubled. From present indications, it is reasonable to expect similar developments in adjoining States. It would seem necessary, therefore, in anticipation of such an increased production, to urge more intensive culture in the growing of better fruit and provide adequate means for distribution and marketing.

Notwithstanding all that has been written and said regarding the importance and advisability of properly grading and packing apples, there are comparatively few of our growers who have attained notable success in establishing on the markets a reputation for their grades and packs. Owing to the nearness to markets, they have not been compelled to combine into selling organizations, as in more remote sections of the country, for the purpose of establishing such a reputation. Each individual has been selling his fruit in a "hit or miss" fashion regardless of the practices of other growers in his section. There has been no uniform standard, and, for the most part, little attention has been paid to this end of the business. The time is not far distant, however, when keener competition, resulting from increased production, will force our growers to adopt some standard in the grading and packing of their apples in order that buyers may recognize at a glance the grade of fruit offered for sale and be assured that it will be as labeled.

With the end in view of establishing uniform grades and packs for Maryland, the last Legislature passed an Apple Grading and Packing Law. The aim of the law is to bring about an improvement in the methods of grading and packing; to insure uniformity in the grades and in the marking of the packages, and to facilitate the marketing of the fruit.

This law applies to all apples grown in the State of Maryland and packed in closed packages for sale. Closed packages include all boxes, barrels, hampers, baskets or other packages covered with burlap, canvas, slat or other covering, the contents of which cannot be seen easily or inspected when such packages are closed.

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No person shall pack, sell, or offer for sale any apples packed in any package in which the face gives a false representation of the contents of such package. The face should represent the average of the fruit in the package, as to size, color and quality. To allow for the inevitable errors in packing fruit, the law specifies that it shall be considered a false representation when more than fifteen per cent of the fruit in the enclosed package is substantially smaller in size than, or inferior in grade to, that shown on the face of such package.

The law makes no restriction as to the size of the fruit which may be packed under any grade or class, but in all cases the minimum size of the fruit in the package must be marked on the package.

According to the law, grade (quality), and size are two distinct characteristics. Under its provisions the grower or owner has the option of five different marks indicating the grade of apples in the packages as follows:

"*Maryland Standard Fancy Grade*" shall consist of apples of one variety, which are well-grown specimens, hand-picked, properly packed, of good color for the variety, normal shape, free from dirt, diseases, insect and fungus injury, bruises and other defects except such as are necessarily caused in the operation of packing; or, apples of one variety which are not more than five per centum below the foregoing specifications on a combination of all defects or two per centum on any single defect.

"*Maryland Standard A Grade*" shall consist of apples of one variety which are well-grown specimens, hand-picked, properly packed, normal shape, practically free from dirt, diseases, insect and fungus injury, bruises and other defects except such as are necessarily caused in the operation of packing; or, apples of one variety which are not more than ten per centum below the foregoing specifications on a combination of all defects or five per centum on any single defect. No apples in this grade shall show less than thirty-three and one-third per centum of good color for the variety.

"*Maryland Standard B Grade*" shall consist of apples of one variety which are well matured, hand-picked, properly packed, practically normal shape, practically free from dirt, disease, insect and fungus injury; or, apples of one variety which are not more than fifteen per centum below the foregoing specifications on a combination of all defects or five per centum of any single defect.

"*Cull Grade*" shall consist of apples not conforming to the foregoing specifications of grade, and shall be classed as culls and shall be so branded. This grade shall be used to include those apples rejected as not meeting the specifications of the foregoing "Fancy," "A" and "B" grades. Fruit which is barred from sale by the United States Pure Food Law or any State Horticultural Laws should not be included in this grade. Since the minimum size of the fruit must be marked on the package, growers must be careful not to include anything smaller than the size they mark on the package.

"*Orchard Run Class*" shall consist of all apples grown in the orchard irrespective of grade or quality. It shall be unlawful for any person to cull or sort from a lot of apples any of the larger sizes or better grades or qualities thereof, and then pack, brand, sell or ship the remaining fruit as "Orchard Run." Fruit barred by the United States Pure Food Law, State Horticultural Laws, or smaller

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than the minimum size marked on the packages, must not be included. This class is provided to take care of the fruit of those growers who are not prepared to grade their fruit under the other four standard grades, or, who feel the quality of their fruit does not warrant grading it, or, who for other reasons do not care to grade.

The law further provides that every closed package containing apples grown in the State of Maryland which is sold, offered, exposed or transported for sale by any person shall bear upon the outside of one end in plain letters and figures, of a size not less than thirty-six point Gothic, the name and address of the packer or the person by whose authority the apples were packed, the true name of the variety, the grade or class of the apples therein contained and the minimum size of the fruit in the package. If the true name of the variety is not known, then it shall be designated as "variety unknown." Every package of apples which is repacked shall bear the name and address of the repacker or the name of the person by whose authority it is repacked in place of that of the original packer. It is unlawful for any person, unless he regrades and repacks the apples, to erase the original size, grade or variety of apples branded upon the package and in its place substitute a size, grade or variety name different from the one marked upon the package by the packer of the apples. The packer or distributor may put markings on the package other than those required by law, provided such marks are not inconsistent with, or more conspicuous than, the required marks. This gives an opportunity for the grower or packer to put on his own brand and name or farm, and facts concerning the quality or other characteristics of the apples in addition to the marks required by law.

Apples packed and branded in accordance with the United States Law approved August 3rd, nineteen hundred and twelve, shall be exempt from the provisions of this law.

The enforcement of the Maryland Law is vested in the State Board of Agriculture, and its officers, employees, agents and servants are authorized to enter upon the land and premises of any person within the State for the purpose of inspecting packages of apples and securing evidence of violation of the law. Any person who violates any of the provisions of the law shall, upon conviction thereof, forfeit and pay to the people of the State of Maryland a sum of not less than twenty-five dollars nor more than fifty dollars for the first violation and not less than fifty dollars nor more than one hundred dollars for each subsequent violation.

While the law legally became effective July first, the State Board of Agriculture was not able to issue regulations as required by law, until about the first of October, at which time it was too late to take steps for its enforcement with this year's apple crop. It is felt that a greater opportunity has thus been given the growers to become familiar with the provisions of the law and accordingly they will have less difficulty in complying with its requirements.

With this end in view, a publication was issued by the Extension Service Department of the State College, giving a detailed explanation of these requirements and offering suggestions which it was hoped would be of assistance to those who desired to avail themselves of the opportunities presented by this law. In addition, packing schools, public demonstrations and field meetings were held in an endeavor to give personal instructions to individual growers wherever possible.

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It is not to be expected that the enforcement of the Maryland Law will prove an easy undertaking. The experience of other States having similar laws shows clearly that there will be numerous difficulties and objections to overcome. New York, Massachusetts, Maine, Vermont, Connecticut and Delaware have laws pertaining to apple grading and packing. Virginia expects to pass one at the next meeting of the General Assembly. The New York Law, in force for two years, seems to have produced gratifying results, yet it is presumed that such results have not been accomplished without considerable objection on the part of at least some of the growers.

One of the chief objections that has been raised by some of our largest growers is in regard to the change in the designation of their brand showing the different grades as specified by the law. There are comparatively few of our growers putting up a pack conforming to the requirements of the "Maryland Standard Fancy Grade." The bulk of our crop is packed in conformity to the "Maryland Standard A Grade" or "B Grade." Heretofore this "A Grade" fruit has, in most instances, been placed on the markets labeled "Fancy." The "B Grade" has been designated "Choice." Thus on certain of the larger markets, where our fruit has been exposed to keen competition, our two packs have become recognized under the markings "Fancy" and "Choice." The change in these markings, necessitated by complying with the new law, will undoubtedly cause dissatisfaction and possibly some confusion. It is to be hoped, however, that by the end of at least one season, the trade will have become familiar with the new designations and our growers reconciled to the change.

At the present time there seems to be a tendency on the part of most of the Eastern States to enact laws designating the grades for, and regulating the packing of apples. It would be a good thing, particularly, for Pennsylvania, New York, West Virginia, Virginia, Maryland, Delaware and New Jersey if there could be the enactment of laws that would designate the requirements and specifications for their grades that would come into competition with each other. In other words, if our apples go out marked as "Maryland Standard A" or "B Grades," showing name and address of grower, etc., it might work out to mutual advantage to have the apples coming from neighboring States marked the same way, thereby eliminating some of the difficulty that exists on the market in regard to markings from different States. The passage and enforcement of such laws would undoubtedly aid very materially in a better distribution and more satisfactory marketing of the apple crop. In the formation of such laws it would be well to consider the requirements of similar laws of other States, to the end that while each State had its own regulations, there would be a unity of the regulatory statutes governing the grading, packing and marketing of apples marketed from every State. Legislation of this character would soon lead to the enactment of Federal laws governing the marketing of this crop. It would seem that such action might be a means for securing a more equal distribution of our fruit and the assurance to our growers of a more uniform price for their product.

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GRAPE CULTURE.

BY WALTER T. MASSEY.
Smyrna, Delaware.

Commercial grape culture on the Peninsula has been carried on for some thirty-five years. Personally, I started out in the year 1880, and since that time the vineyards have been increased in Kent County to a large extent. This thing has been hashed and re-hashed so I don't think it is necessary to go into detail. We can raise, and do raise, various varieties of grapes on this Peninsula, and the quality is good.

What remarks I have to make I would like to make along the line of getting the crop harvested, packed and marketed. For a number of years, probably ten, quite a few of our growers have gotten into the habit of cutting the fruit green and putting it on the market in that condition. The results have been serious. Moore's Early as soon as colored somewhat is not edible, and some pick these grapes and ship them to New York or Philadelphia in this green condition. They obtain a high price, claiming they got the money by putting them in early. A grape never ripens after being cut; if it isn't fit to eat when cut, it never is. The consumers will buy these grapes and they bite into them and find that they are not good and they are soon thrown away, and that family buys no more grapes for sometime.

The next thing, is the market. The only markets that are open to the grower at this time are Wilmington, Chester, Philadelphia, and New York. We used to have Boston. The buyers won't buy them the second time because they are not edible, and we are out of Boston on that account.

When I first began to grow grapes we used the ordinary peach basket, and I must say they netted us more per pound than the small three-pound baskets now do, around five to eight cents per pound, and now you can hardly realize two or three cents per pound.

Among the varieties the white grape would bring several cents more per pound than the black grape. The Niagara would bring several cents more. The trouble today is that they look nice but are sour as vinegar because they are cut before they ripen, and this kind of fruit will not bring the price. Why is this done? They say, "because we might as well rush them in and get something for them." If properly sprayed there is no reason why the Niagara should not be grown on this Peninsula as well as anywhere else. A few words about the newer varieties. Very often we see a new variety and it is an old variety renamed. This is true of King Philip. King Philip is identical with Campbell's Early; it looks the same and tastes the same. Another grape introduced several years ago called the King, and the history of this King was

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a stray vine found among some other vines ordered from a nursery. If there is any difference between King and the old Eaton, I never could find it. The foliage is the same and the fruit is the same. Another one is Star and the peculiarity about it is the first, second and third bunches are smaller than the fourth and fifth. Bunches large, grape small and only ordinary quality and very late ripening, generally getting caught by frosts in October. The prospect is not a good one on account of harvesting the crop before it is ripe.

DISCUSSION.

Question—When do you think it is the proper time to trim grapes?

Mr. Massey—If you only have a few, just before the start of the sap, February is usually the best time.

Question—What is the most profitable package you find?

Mr. Massey—That is a question I am unable to answer. Most of our growers have gone to the three-pound basket. The commission men of New York York tell me that all of those baskets that are sold to out of town buyers they insist that ten be tied together and it takes a good deal of time and good deal of cord.

Question—When do you make the first spray for mildew or rot?

Mr. Massey—The last of May when the branches measure eight to ten inches long, before the fruit blossoms open; the fruit stem is there but it has not blossomed yet. In this locality grapes bloom June first to tenth.

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INSECT AND FUNGUS CONTROL.

E. N. CORY, ENTOMOLOGIST,
Maryland Agricultural Experiment Station.

Spraying and Other Practices for the Control of Insects and Fungi.

In advising measures for the control of insects and fungi, the character of farming each individual is pursuing must be considered. Thus: A commercial fruit or truck grower should apply all sprays that are necessary to give him approximately 100 per cent perfect fruit or truck, otherwise, his margin of profit will be greatly reduced. On the other hand, the general farmer, not dependent upon the maximum returns from his home orchard, or any single truck crop, need spray only sufficiently to protect his crop from the major insects and fungi; thereby securing fruit reasonably free from defects, that will sell on local markets to advantage, or that will keep well for home consumption.

With this in view, the following calendar is divided into two parts. The first concerns the general farmer, who should plan to protect his crops by spraying as regularly as he plans his plowing or seeding. The second portion is written with the view of giving the latest methods to the commercial grower for securing a maximum crop of perfect fruit or vegetables.

SPRAY MATERIALS — CONCENTRATED LIME-SULPHUR.

Home-Made Concentrated Solution.

Best stone lime (at least 95 per cent calcium oxide).....50 pounds.
Sulphur (any kind finely ground, 98 per cent pure).....100 pounds.
Water .....50 gallons.

Directions.

Heat about twenty gallons of water in an iron vat or by steam in barrels to near boiling, and add stone lime and sulphur gradually to prevent boiling over. Vigorous action will take place and cold water should be near at hand to be added gradually, to make a total of about 55 gallons. The solution should boil vigorously for one hour. It is then ready to be stored or to be diluted and used at once. In storing the solution, it is necessary to exclude air from it as much as possible, by either filling up the barrel or other container completely with the liquid, or by putting a film of oil on the surface of the solution. The stored solution should be protected from extreme cold weather.

SELF-BOILED LIME-SULPHUR.

Preparation.

Use eight pounds of flowers or flour of sulphur, eight pounds of stone lime, to fifty gallons of water. The mixture should be made in a kettle, barrel, or receptacle of sufficient size. Better results can be obtained with larger quantities. The necessary amount of lime should be placed in the receptacle and water poured on the lime to start it slaking. When the lime begins to slake, add the eight pounds of sulphur. Stir the mixture and add water as needed to keep a pasty condition until the lime is all slaked. Do not allow any dark, yellow color to form, as it will if the heat becomes too great at any point. If

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the sulphur is lumpy, it may be put in a finely divided condition by passing it through a fine mesh sieve. The heat generated by the slaking lime causes the sulphur to mix physically with the lime in very fine state, but should not be continued to form any of the sulfide combination indicated by the dark yellow or brown color. Therefore, it is essential that the proper amount of water be added to cause a violent boiling of the mixture for a few minutes, and as soon as the lime is well-slaked, add cold water to make the required amount. The self-boiled lime-sulphur is now ready for use. The time to allow the mixture to boil will vary accordingly to the lime used, as some lime will slake more quickly than others. It should show only a faint yellow color before diluting.

In the case of spraying a commercial orchard, it is advisable to prepare larger quantities in order to secure more uniform results. The mixture settles rapidly and requires thorough agitation.

BORDEAUX.

Copper Sulphate	4 pounds.
Stone lime	5 pounds.
Water	50 gallons.

Dissolve the number of pounds of blue-stone indicated by the first figure of the formula, in a few gallons of water. Fill the spray barrel two-thirds full of water and add the dissolved blue-stone. Slake the number of pounds of lime indicated by the second figure of the formula by slowly adding water until it becomes a thin paste. Wash the lime through a twenty-mesh sieve into the solution in the spray barrel, adding water until there is fifty gallons of the whole. Agitate thoroughly and the mixture is ready to apply.

COMMERCIAL SPRAY MATERIALS.

Substitutes for the Home-Prepared Products.

To take the place of home-made concentrated lime-sulphur, the grower has available many excellent commercial brands of concentrated lime-sulphur. In addition, for badly infested orchards, several miscible oils are on the market for use in the dormant season against scale insects.

As a substitute for self-boiled lime-sulphur, a material known as Atomic Sulphur is available. This is equally as effective in controlling brown rot on peaches as the self-boiled lime-sulphur, though its sticking qualities are considerably less.

For use where Bordeaux is recommended, the grower can substitute any of a number of prepared Bordeaux mixtures, some of which have arsenate of lead added during their manufacture.

PINE TAR CREOSOTE EMULSION.

8 Per Cent Solution.

Pine Tar Creosote	1 gallon.
Caustic Soda	2-3 pound.
Water	11 gallons.

Dissolve the caustic soda in 1 gallon of water in a large vessel, stir in vigorously the creosote, add eleven gallons of water, and strain into spray barrel.

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RESIN STICKER.

Resin	2 pounds.
Sal Soda	1 pound
Water	1 gallon

Boil in an iron kettle in the open for 1½ hours, or until a clear brown liquid is obtained. This is sufficient for fifty gallons of spray.

ARSENICALS.

Arsenate of lead is the standard stomach poison of the present. It is furnished in both powder and paste form. The former is much the easier to use as it can be used dry, as a dust, or combined with liquids. The paste is not easily kept for any length of time because of evaporation, and hence can not be held over from one season to another as easily as the powder.

Arsenate of lime is effective for truck crops and is about two cents cheaper per pound.

Arsenite of zinc is a quick acting poison, valuable for truck-crop work.

Any of the above should be used at the rate of one pound of the powder per fifty gallons of spray on the ordinary insects. Beetles usually require 1½ pounds per fifty gallons.

SEED TREATMENT.

Potatoes.

CORROSIVE SUBLIMATE OR MERCURY BICHLORIDE: POISON.

Make a solution of four ounces to thirty gallons of water. Immerse whole potatoes in the solution for 1½ hours; dry and cut. Use only 3 or 4 times.

FORMALIN: POISON.

One pint to thirty gallons of water. Immerse whole potatoes for from 1½ to two hours; dry and cut.

MECHANICAL CONTROL MEASURES.

Wire Covers for Cucumbers.

Wire dish covers, costing about five cents each, should be used as a protection to melons and cucumbers. These should be dipped in linseed oil and white lead before use. When so treated, they will last indefinitely. They can be nested together in small space for storage.

Worming Peach Trees.

The knife and a flexible wire are still the best method for combating the peach tree borer. Pull the earth away from the tree crowns one day prior to worming. This allows the tree to dry and shows up the new "castings" or "frass" to good advantage, thus facilitating the finding of the borers. Take out the borers in May, mound up the earth immediately thereafter, and worm again in October, leaving the earth level around the tree.

SPRAYING POINTERS.

1. Use a machine of adequate capacity.
2. If a power sprayer is used, consider weight, type of pump, and simplicity of the engine and its gearing to the pump.
3. Valves should be easily accessible and preferably of the ball type.
4. Packing should be easily replaced.

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5. Relief valves should be simple and reliable.
6. Propeller agitation is the most satisfactory.
7. Get the best accessories.
8. Cut-offs should be two-way and quick in action.
9. Nozzles should be of the angle type, of large capacity, with a minimum number of parts.
10. Wire-wound hose is cheapest in the end and best for orchard work.
11. Spray to cover every part of the tree or crop.
12. Strain your materials thoroughly.
13. Have adequate water supply, preferably under pressure.

MANUFACTURERS OF SPRAY MACHINES AND ACCESSORIES.
(Partial List.)

Bateman Mfg. Co.,	Grenloch, N. J.
Bean Spray Pump Co.,	Lansing, Mich.
Brown Co., E. C.,	Rochester, N. Y.
Deming Co.,	Salem, Ohio.
Friend Mfg. Co.,	Gasport, N. Y.
Goulds Mfg. Co.,	Seneca Falls, N. Y.
Hardie Mfg. Co.,	Hudson, Mich.
Hurst Mfg. Co.,	Canton, Ohio.
Meyers & Bros., F. E.,	Ashland, Ohio.
Morrill & Morley,	Benton Harbor, Mich.
Spramotor Co.,	Buffalo, N. Y.

MANUFACTURERS OF DUSTING APPARATUS.

Niagara Sprayer Co.,	Middleport, N. Y.
Dust Sprayer Co.,	Kansas City, Mo.
Leggett & Bro.,	New York, N. Y.
Tow-Lemons Co.,	Springfield, Tenn.

MANUFACTURERS OF INSECTICIDES AND FUNGICIDES.
(Partial List.)

Ansbacher & Co., A. B.,	New York, N. Y.
Blanchard Co., J. A.,	New York, N. Y.
Corona Chemical Co.,	Milwaukee, Wis.
Devoe & Reynolds,	New York, N. Y.
Grasselli Chemical Co.,	Newark, N. J.
Kil-Tone Chemical Co.,	Newark, N. J.
Niagara Sprayer Co.,	Middleport, N. Y.
Pratt Co., B. C., 50 Church St.,	New York, N. Y.
Rex Co.,	Rochester, N. Y.
Sherwin-Williams Co.,	Cleveland, Ohio.
Thomsen Chemical Co.,	Baltimore, Md.
Thum, O. & G.,	Grand Rapids, Mich.
Vreeland Chemical Co.,	Little Falls, N. J.

MANUFACTURERS OF NICOTINE SOLUTIONS.

Kentucky Tobacco Products Co.,	Louisville, Ky.
Grasselli Chemical Co.,	Newark, N. J.
Parke, Davis Co.	Detroit, Mich.

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PROGRAM FOR

CROP.	PESTS.	SPRAY OR OTHER CONTROL MEASURES.
Apple, Peach, Plum, Grape, Cane fruits, and all shrubs.	San Jose Scale, Plant Lice, Leaf Curl, and other diseases.	Concentrated Lime Sulph part to 9 parts of water
Apple.	Codling Moth. Curculio. Apple Diseases.	Concentrated Lime S 1-40 plus 1 lb. arsen lead powder.
Peach. Plum Cherry.	Curculio. Brown Rot. Leaf Diseases.	Atomic sulphur, 5 lb.— plus 1½ lb. arsenate of powder.
Irish Potatoes.	Potato Beetles, Flea Beetles, Leaf Diseases.	Bordeaux, 4-5-50 plus arsenate of lead powd
Tomato.	Tomato Worm, Flea Beetles, Blight.	Bordeaux, 4-5-50 plus senate of lead powder.
Cucumber, Melon.	Cucumber Beetles.	Cover with wire dish until leaves are rough.
	Blight. Aphis.	Bordeaux, 4-5-50 plus cent nicotine sulphate pints.
Peas.	Aphis or pea louse.	40 per cent nicotine sul ½ pint plus 2 lb. of so 50 gal. of spray.
Cabbage.	Worms. Flea Beetles.	Dust with prepared dry deaux and arsenate of or an arsenate in slaked 1 lb. to 25 lbs.

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TIME OF APPLICATION.			REMARKS.
	SECOND.	THIRD.	
s are g to			Only one application except in extreme cases when a spray should be applied in the fall.
week pet- fal-	July 1st to July 15th.		Use Bordeaux for the second application if bitter rot is present.
ater.		As before.	See table for commercial growers, to control brown rot in warm, damp seasons or localities.
atoes nches	When beetles reappear.		
when push ound.	Every 2 weeks until plants are set.		
			The underside of the leaves must be hit. Use an angle nozzle. Hit the bugs.
is ap-	10 days later.		
is ap-	7 days later if aphis reappears.		These insects multiply rapidly. Watch for first lice and begin spraying at once.
rms	When worms reappear.		

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PROGRAM FOR TH

CROP.	PESTS.	SPRAY OR CONTROL MEASURES.
Apple, Peach, Plum, Grape, Cane fruits, and all shrubs.	San Jose Scale. Aphis Eggs. Peach Leaf Curl.	Concentrated lime sulphur, 1-9
Apple.	Codling Moth, Curculio, Leaf Spot Disease, Scab.	Lime sulphur 1-40 plus 1 lb arsenate of lead powder.
	If aphis are present.	Add 40 per cent nicotine sul phate at rate of ½ pint t 50 gals. of the above.
	Bitter Rot, Black Rot.	Bordeaux, 4-5-50.
	Wooly aphis on limbs.	10 per cent Kerosene emulsion
	Wooly aphis on roots.	8 per cent Pine Tar Creosot emulsion.
	Round Head Borer.	Remove with wire and knife.
Peach. Plum. Cherry.	Curculio. Brown Rot.	Self-boiled lime sulphur, 8-9 50, plus 1½ lb. arsenate o lead powder.
Peach.	Peach Tree Borer.	Remove in May and September mound up earth at firs worming.
Currant. Gooseberry.	Aphis and Currant worms.	1 lb. arsenate of lead in 5 gal. water plus 40 per cen nicotine sulphate, 1-1000.
Grape.	Flea Beetle.	1½ lb. arsenate of lead plus quart of molasses to 50 gal lons of water.
	Aphis.	40 per cent nicotine sulphate ½ pint plus 2 lbs. of soap t every 50 gallons.
	Black Rot.	Bordeaux, 4-5-50.

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TIME OF APPLICATION.				REMARKS.
FIRST.	SECOND.	THIRD.	FOURTH.	
When buds are swelling.				Delay spraying as late as possible on apple to control aphis.
Within 1 week after petals have fallen.	10 days after the first.	July 1 — July 15.	Aug. 1-15, Bordeaux alone.	
Whenever lice appear in numbers.				
June.	September.			
Just as the husks are falling, May 1-10.	4 weeks later.	4 weeks later, omit arsenate of lead; (for late varieties.)		
Spray when worms or aphis appear.				
When beetles first appear on buds.	10 days later. if beetles reappear.			
When aphis appear on shoots				
Just before blossoming.	Just after fruit has set.	When berries are the size of peas.	When berries begin to touch	

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PROGRAM FOR T

CROP.	PESTS.	SPRAY OR OTHER CON TROL MEASURES.
Irish Potato.	Colorado Potato Beetle, Flea Beetle Blight.	Bordeaux, 4-5-50 plus 1½ l arsenate of lead.
Tomatoes.	Flea Beetle. Blight. Tomato Worms.	As above.
Cucumber and Melon.	Cucumber Beetles.	Wire dish covers until leav are rough.
	Aphis. Blight. Anthracnose.	Bordeaux, 4-5-50 plus 40 p cent nicotine sulphate 1 pint.
Peas.	Pea aphis.	½ pint of 40 per cent nicotin sulphate plus 2 lbs. of soa to 50 gallons of spray.
Cabbage.	Cabbage Worms. Flea Beetle. Aphis.	Dust with 1 lb. of arsenate o lead in 25 lbs. slaked lim or with Micro, or Bordeaux spray with arsenate of lea or lime, or arsenate of zin with soap or resin spreader

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OMMERCIAL GROWER.

TIME OF APPLICATION.			REMARKS.
FIRST.	SECOND.	THIRD.	
When plants are 4 inches high.	2 weeks later.	When beetles reappear.	
When plants are pushing out of ground.	Every 2 weeks thereafter until plants are set.		Additional spraying in the field may prove beneficial, but the profit therefrom is debatable.
When plants begin to run, or earlier if aphis are present.	10 days later		Requires about 100 gallons per acre.
When aphis first appear.	7 days later if aphis reappear.		Begin spraying when aphis first appear; they multiply rapidly.
When worms appear.	When worms reappear.		Add nicotine sulphate, ½ pint to 50 gals. to control aphis.

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REPORT OF THE COMMITTEE ON FUNGUS DISEASES FOR 1916.

BY THOMAS F. MANNS.

In our last report, attention was called to the concern felt over the activity of the white pine blister rust. This season, I must report the disease spreading exceedingly rapidly; it has now been found in all the New England States, and also in New York, Pennsylvania, New Jersey, Illinois, Minnesota, Wisconsin, and the Provinces of Ontario and Quebec, in Canada. It has been predicted that it will become much more disastrous than the chestnut blight, which means that millions of dollars worth of pine will be destroyed. It is fortunate that the Peninsula is covered with the two and three needled pines which are not affected with this disease. On January the 18th, at Washington, is to be held a conference on the White Pine Blister Rust. A representation of executives, foresters and plant pathologists from many States will be present. Recent work done by W. H. Rankin in New York State on eighty-five forest plantings of white pine has shown that by removing all currants and gooseberries for a distance of five hundred feet from the pines, control is possible; the infections since 1909 have been reduced from thirty-six plantings to four. The currants and gooseberries as the intermediate hosts greatly aid in spreading the disease.

Quarantine Partly Lifted on Potatoes From Canada.

The Federal Government has partially lifted the ban on potatoes from Canada. Shipments not exceeding a total of 10 per cent infection of scab, Fusarium, and other diseases, may be imported. This partial lifting of the quarantine has been made to relieve the difficulty of a potato shortage.

New Diseases.

The eel worm disease (*Heterodera radicicola*) on white potatoes has been found near Seaford, Delaware. This is the first report, as far as the author has been able to learn, that has occurred in the East. California has quarantine laws against infected seed from Utah, Nevada and Idaho. The disease is characterized by watery pimples all over the tuber. Recent work by the Delaware Agricultural Experiment Station has shown the pox or so-called "soil rot" of sweet potatoes to be a slime mold disease. This season the disease was found seriously affecting white potatoes shipped in to Delaware from two vicinities in Maryland. We have been able to get infection during the past three years on white potatoes grown upon sweet potato sick soil. Unlike the slime mold disease that causes club root of cabbage which is controlled by heavy applications of lime, this new slime mold is more active and disastrous on limed plots.

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Progress in Producing Disease Resistant Plants.

Again, the committee must call attention to the splendid progress by pathologists in producing resistant strains of plants to diseases. The Maryland Station, the Bureau of Plant Industry, and the Delaware Station, have been continuing the development of wilt resistant tomatoes with much promise of success. Likewise, the two stations are working on wilt resistant strains of cabbage. The greatest difficulty faces the investigation when these selections are to be put on the market. Commercializing the product sometimes does not result in delivering the goods.

Tomato Blight.

Work by J. B. S. Norton and the U. S. Department, Bureau of Plant Industry, does not indicate much success in obtaining blight (*Septoria*) resistant tomatoes; Norton has found the horse nettle (*Solanum carolinense*) a susceptible host. Our observations indicate that the horse nettle is an active agent in spreading the disease.

New Spraying Methods.

The work of the Cornell College and Station would indicate that powdered sulphur and dry powdered arsenicals hold much promise in controlling plant disease. The entire subject of dusting is in the experimental stage. It has been made the subject of three bulletins by the New York (Cornell) Station, and is being extensively advertised by the Niagara Sprayer Company. The method shows considerable promise on apples, as indicated by the work of the Cornell Station. The cost of materials is heavier than for liquid sprays but the rapidity of work is much greater. Claims of forty acres a day is being made by the Niagara Sprayer Company. The Cornell Station has shown that for grapes, a sulphur is injurious and a diluent must be used. The following table shows the results on grapes for powdery mildew (*Uncinula necator*).

Treatments	Dates of Application.			Per cent of Clusters Free From Disease	Amt. of Injury from Treatment.
Untreated	.....	.....	.....	4 free	.....
Bordeaux	.....	8-11	.....	6 free	None.
75 per cent sulphur	7-18	8-2	8-16	96 free	Severe burning.
50 per cent sulphur	7-18	8-2	8-16	83 free	Small amt. burning.
25 per cent sulphur	7-18	8-2	8-16	77 free	Slight burning.

Generalization on Dusting Methods, Summarized by the Cornell Station.

"It now seems settled that a mixture of insecticide and a fungicide can be applied in powdered form, using air as a carrier, with better commercial results in the control of preventable apple diseases and of apple insects than can be obtained by spraying. At the same time, the dust method makes it possible for the owner of a large acreage to protect his orchard at critical times, a thing that he has not been able to do with the slow liquid process.

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The method seems to be adapted to conditions as they exist in apple orchards in most parts of New York. The only objection at present to the complete substitution of the dust method for spraying in these sections is that there is no known dust preparation now available which will kill scale insects, and no dust preparation which is effective against such insects as aphis and pear psylla. It may be confidently stated that when as much time and effort has been expended in developing spraying methods for their control, such a preparation will be found. In the meantime those persons who must spray for scale and for aphis and who can cover their orchards in two days, will do well to continue with the liquid method. Those who cannot cover their orchards in less than a week, or in two weeks, will find much needed relief in the dust method, which admits of operation for one team, or even two teams, less, or allows for more extensive and better cultivation of field crops.

In those sections of the State where San Jose Scale does not exist—as for example, in the Wyoming Valley—the dust method might be adopted with great benefit. In general the trees in this valley are very old and unusually large, thus discouraging the use of a sprayer. The dust may be blown to the tops of the highest trees, and with air for a carrier perfect distribution can be secured."

Following is a list of those manufacturing Dusters, and those having dusting sulphur and powdered lead arsenate for sale:

Dusters.

Corona Chemical Company, Milwaukee, Wisconsin.

Kansas City Dust Sprayer Manufacturing Company, W. L. Terhune, General Eastern Agent, Waterville, New York.

Leggett and Brother, 301 Pearl Street, New York City.

Niagara Sprayer Company, Middleport, New York.

Tow-Lemons Manufacturing Company, Springfield, Tennessee.

Dusting Mixtures.

Corona Chemical Company, Milwaukee, Wisconsin.

Kil-Tone Company, Malvern Street, Newark, New Jersey.

Niagara Sprayer Company, Middleport, New York.

B. G. Pratt Company, 50 Church Street, New York City.

W. L. Terhune, Waterville, New York.

Vreeland Chemical Company, 50 Church Street, New York City.

Dusting Sulphur.

Niagara Sprayer Company, Middleport, New York.

W. L. Terhune, Waterville, New York.

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Powdered Lead Arsenate.

Corona Chemical Company, Milwaukee, Wisconsin.
Grasselli Chemical Company, Cleveland, Ohio.
Hemingway & Company, Bound Brook, New Jersey.
Interstate Chemical Company, 12 Bayview Avenue, Jersey City, New Jersey.
Kil-Tone Company, Malvern Street, Newark, New Jersey.
B. G. Pratt Company, 50 Church Street, New York City.
Riches-Piver Company, 30 Church Street, New York City.
Sherwin-Williams Company, 601 Canal Road, Cleveland, Ohio.
Thomsen Chemical Company, Baltimore, Maryland.
Vreeland Chemical Company, 50 Church Street, New York City.

The Need of Blight Resistant Graft Stock for Apple and Pear.

We have met with exceedingly large losses on apple from the pear blight organism. One of the most discouraging forms is the killing of trees in bearing by the destruction of the susceptible graft stock below the point of graft. The small amount of blight to the blossoms and twigs of such trees would indicate that little damage would have resulted, had the grafted root been resistant. Too much emphasis can not be placed upon this phase of fighting losses from blight.

I must again call attention to the work of Professor Reimer of the Southern Oregon Experiment Station, as given in the Monthly Bulletin, California, State Commission of Horticulture, Volume 5, No. 12, page 431.

"Reimer's work has been most systematic, and has demonstrated that great improvement in nursery stock will result from discarding the French seedling and substituting the Japanese or Chinese seedling, sometimes called the sand pear. For years this was known to botanists as '*Pyrus sinensis*,' but Rehder, of the Arnold Arboretum, has recently determined that '*Pyrus serotina*,' is the correct name of the species generally used by nurserymen under the names 'Japan seedling,' or 'Chinese seedling.' This species is quite resistant to attacks of the wooly aphis of the pear and remarkably resistant to blight. Reimer repeatedly inoculated the roots of this species with blight without producing a single case of the disease. At the same time he made similar inoculations with the same culture in the roots of French seedlings in adjoining rows, killing 100 per cent with blight."

Sweet Potato Diseases.

The season of 1916 showed quite a marked reduction in the prevalence of black rot. Other diseases were about normal. Both stem wilt (*Fusarium batatis W.*) and pox seemed to have spread over a wider range than had previously been reported.

The pox disease has been found to be caused by a new parasitic slime mold (*Cystospora batata, Elliott*). This organism may be carried over either in the diseased potato roots or in the soil. There are two modes of attack on the roots—by the plasmodium penetrating the root over a considerable area, causing large, shallow pits, or by swarm spores infecting small rootlets and thence invading the main roots, causing deep circular pits. Evidence shows that the organism persists in the soil for a number of years. No effective control measures have, as yet, been found. Liming increases the disease.

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Sweet Potato Storage.

Four years of work of the Delaware Station in co-operation with the U. S. Department, on sweet potato storage, have given data of very valuable assistance in this field. Soft rot is the disease most to be effectively controlled by maintaining proper temperature and humidity in the storage houses. Humidity can be controlled to a large extent by proper heating and ventilation, except during certain periods of damp, warm weather, early in the season. The critical period in the storage of sweet potatoes is during the first few weeks when the potatoes are giving off excessive amounts of moisture. At this time, great care should be taken in the matter of ventilation. Careful handling of the potatoes to avoid bruising will considerably reduce losses in the storage.

Cucurbit Diseases.

The cucurbit diseases in 1916 caused serious losses in most sections. Leaf spot of canteloupe (*Alternatia brassicae var-nigrescans Pegl,*) was universally present and completely blighted the vines in most fields quite early in the season. Blossom end rot and anthracnose diseases were prevalent and serious on the watermelon, largely reducing the yields.

Principal Diseases of 1916.

Among apple diseases, "Fire blight" and "blight canker" (*Bacillus amylovorus* (*Burr*) *Betoin*) so far exceeded all other diseases as to make the others relatively unimportant. Hairy root, crown gall (*Bact. tumefaciens, Smith*) and black rot (*Sphaeropsis Malorum Pk.*) were about as common as usual. A heavy local infection of apple rust (*Gymnosporangium macropus Lk.*) was observed near Milford, Delaware.

Leaf blight (*Alternaria brassicae var. nigrescans colletotrichum lagenarium*) (*P.*) E. & H. and blossom end rot of watermelon were prevalent and serious cucurbit diseases.

Chestnut blight (*Endothia parasitica* (*Murr.*) *And.*) is epidemic; only a few hardy road-side trees survive.

The egg plant crop was almost a total loss in some localities due to anthracnose (*Gleosporium melongenae E. & Hal.*)

Crown gall (*Bact. tumefaciens, Smith*), yellows and little peach were the most serious peach diseases. Brown rot, blossom, and twig blight (*Sclerotinia fructigena* (*Pers.*) *Schrocta*) caused considerable losses.

There was a marked decrease in the amount of black rot (*Ceratocystis fimbriata E. & H.*) in the sweet potato crop. Stem wilt (*Fusarium batatis W.*) and pox (*Cystospora batata, Elliott*) appeared to be more prevalent and in more widely scattered areas.

The most serious tomato diseases of the season were leaf spot (*Septoria lycopersici Speg.*), mosaic, and sleeping sickness (*Fusarium sp.*). Mosaic seems to be increasing in prevalence.

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CANNING TOMATOES RESISTANT TO FUSARIUM.

J. B. S. NORTON.

The ideal method of controlling diseases by growing varieties of crops which are not subject to injury by the particular diseases which attack the ordinary varieties of the same crop, has already led to good results in finding disease free, resistant, or tolerant varieties of tomato.

As early as 1896, Robinson, at the Maryland Experiment Station, began experiments to test the relative increase from spraying for blight on different varieties, but like most other comparisons of varieties in the field for this purpose, the results were not definite enough to be satisfactory. Some work was also done in Germany in 1907 on tomatoes resistant to the Septoria leaf blight, and I have followed this line out on a large scale the past year with many varieties in the seedling state, and find that there is quite a difference at least in the young plants in both the time it takes for the disease spots to appear on the young leaves of different varieties, and also in the number of spots developing under similar conditions.

In 1914 I reported two varieties, Stone and Sterling Castle, that were found to be quite resistant to the leaf mold disease so troublesome in the green house.

I may say here that some of my experiments now in progress show that susceptibility to Septoria, the great pest of all our tomato fields, can be decreased by nourishing the plants better. The starved plants have a greater percentage of the total leaf surface covered by the disease spots and the spots appear sooner.

With the Fusarium disease which attacks the inside of the stem and causes the vines to slowly wither and often die entirely about the time they begin to bear fruit, the developing of varieties which will yield a good crop on land infected with the disease has been most promising of all, and certainly most interesting to residents of the tomato growing region of Delaware and Maryland, where this fungus is now playing havoc on many farms. Last summer I saw numerous fields in the trucking region of eastern Maryland that scarcely yielded a tomato, so thoroughly was the land filled with this fungus. And it is rapidly spreading, not only on the lighter land, where it is generally worse, but also to a damaging extent on heavier soils. Most of what is known as tomato blight in Maryland is this disease, more properly called wilt.

The first selection of fusarium resistant tomato varieties that I have record of was reported by Essery of the Tennessee Experiment Station in 1912. He has selected and bred a fusarium resistant strain of the Beauty type. Edgerton and Moreland, in 1913, reported having found resistant strains of Acme in Louisiana. All this work no doubt rests on the previous investigations of fusarium resistance in other plants worked out in the U. S. Department of Agriculture, and other places.

In 1912 I began to test out on wilt infected soil on the Eastern Shore of Maryland, a large number of tomato varieties. This investigation showed quite certain differences in resistance among the varieties tested, but none of the varieties generally suited for canning were found to show any decided freedom from the disease. Aside from the smaller fruited varieties more or less resistant as a

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class, Duke of York, Buckeye State, Faultless, Gold Ball, Golden Queen, Dwarf Stone and Globe, showed decidedly less of the disease than the others.

I began that fall to select the best plants from the worst infected fields that I could find of the usual canning varieties in order to find a resistant strain of a good canning tomato. The seed of a number of good plants from several different Eastern Shore fields were planted on infected soil in 1913, and while some of them, as expected, proved to be no better than the usual strains, several showed decided vigor and healthfulness in their offspring and this has been maintained now for three more years under a variety of conditions, so that it cannot be doubted that we have a valuable wilt resistant strain of Greater Baltimore, and another of Stone, or at least of the Stone type. Perhaps I should say, wilt tolerant, as the fungus is not absent from very many of the plants when grown on infected soil, but the supreme test is that they grow vigorously and yield a big crop when plants of the same variety not selected for wilt resistance when grown along side them die or do very poorly.

Of course, like in all development of new kinds of crops, the problem is not ended when we have demonstrated the presence of the desirable character; it must be selected out from all undesirable strains or mixtures and made as pure as possible, and a sufficient quantity of seed grown to supply the needs of growers. I have pedigreed these selections for four years and have several different parentages that so far have shown no undesirable features, yielding well on wilt soil and of a good type of fruit. Other lines of descent been discarded. For two years some samples of these seeds have been distributed to various farmers, canners and seed growers in order to have them tested under a wider range of conditions and also to give any one who desired an opportunity to grow a stock of seed for the use of himself and neighbors. So that now a number of persons in Maryland should have seed of these strains on hand for the 1917 planting. Some of the selections sent out will, of course, prove of no special value or may contain mixtures that will have to be bred out, as in the beginning it cannot be told before hand which are the good parents, and where there are several kinds grown closer together there is bound to be some crossing. What we want now is to get several fields of considerable size this year of the kinds which have done best and develop enough seed to supply the demand for 1918. We have several pounds of seed grown at Ridgely last summer and smaller quantities from the pedigree fields at College Park. The Bureau of Plant Industry, at Washington, has grown about 70 pounds, I understand, of a very fine Stone type from one of my selections, and want to test it out another year on the farms of this tomato region. There should be a number of farmers with a stock of this seed on hand from last year's crop. Only one has informed me that he has enough to sell. This particular lot has been grown for two years on badly infected land and yielded 90 per cent of a good crop of Greater Baltimore where the ordinary stock of the same variety beside it did not give a 25 per cent crop.

These selections would not be expected to be resistant to the bacterial wilt which is present on some farms. Nor to the leaf blights; and yet the work which I have mentioned before shows that the varieties found to be resistant to Septoris in the seedling state, include some of my fusarium resistant selections, and nearly all the varieties which I found to be fusarium resistant in 1912. So that if we grow the wilt resistant kinds even, if we do not kill two birds with one stone, we can at least wound them pretty badly.

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WHITE POTATOES.

FRANCIS E. MATTHEWS,

Pocomoke, Md.

The importance or necessity of the potato as an article of food, I believe, is beyond question. I have seen it stated that it is absolutely imperative that ships bound on long voyages, in order to insure or protect the health of their crews against scurvy, lay in large supplies of potatoes. Also in Alaska, where all vegetables are scarce, the potato is at times almost worth its weight in gold, not only for its palatable qualities as an article of diet, but also as a sure preventive of this dread disease, scurvy. I have read that Aaron Burr, finding it best for a time to disappear, took refuge in a cellar in New York, living entirely on potatoes for a period of six weeks, and came out in better physical condition than when he went in hiding. In poor, unhappy Ireland, the potato is said to be one of the principal sources of food. This must be true, for according to America's greatest writer and student of human nature, "Mark Twain," nature herself, wishing to aid in the easy consumption of this great vegetable, has enlarged the Irish mouth to a certain extent. In one of his books he relates the following incident in support of this theory: When his writings were beginning to make him famous he left the West for a time and paid a visit to the city of Washington. He was received with delight, as he deserved, and much attention was shown him. One evening when invited out to dinner, a lady and gentleman were ushered into the drawing room and introduced as Mr. and Mrs. Orelay. He seemed to remember them vaguely, seemed to remember meeting them somewhere, but could not place them and did not succeed in doing so until invited out to dinner when the couple were placed opposite him at table, and then when potatoes were served (as they always are) he remembered them. When he was working in the mines he remembered an Irishman and his wife by the name of O'Riley, the wife doing washing and mending for the miners, the husband, O'Riley, doing odd jobs about the place. It seems that O'Riley afterward struck it rich, sold out, and he and his wife came East, changed their names a little bit, in fact, started the world over again as Mr. and Mrs. Orelay, but in spite of good clothes and a change of name Mr. Clemmens recognized them at once when potatoes were served, as he says he, O'Riley, had a regular potato mouth.

I deem it useless to cite any further authority as to the importance and usefullness of this vegetable, as I have no doubt most, if not all of us are already aware of it.

The next thing to speak of is how to grow it most successfully. Not being an expert, I will give the methods practiced in my section. The first essential—and

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this I am sure of—I am now speaking of the early crop, is well-drained soil in a good state of cultivation, the richer the better, as you can't fool an Irish potato. A splendid supply of vegetable matter seems absolutely necessary for a good crop. Stable manure comes first as a source. In the absence of this most valuable commodity the best substitutes I know of are a Red Clover or Timothy sod, Cowpea sod, Crimson Clover sown early as possible the preceding fall. Rye sod is a good substitute for clover or peas, in fact, I have been unable to see but little difference in yield between it and the legumes mentioned. I notice the use of rye gives a gloss or clear, smooth appearance to the tubers that manure or sod fail to impart. I regard rye as a very great help, especially to the early crop. Good seed is also of great importance, and while I may be accused of blowing my own horn, I honestly believe there is no better seed than the late crop of Cobbler grown from seed kept in cold storage and planted last of July or first of August. They are comparatively free from disease, run further, that is, plant more ground to barrel, produce a bigger crop, and I have never been able to see any appreciable difference in maturity between them and Maine-grown seed, and I have been observing them closely, both planted side by side, for quite a while.

The question of fertilizer is a most important one. The absence of potash, as last season, again confronts us, as the high price of this article makes it prohibitive if used in any quantity, so I think we must make up our minds to do without it again as most growers in my section did in 1916, and we made a most excellent crop, and I have no doubt we will do so again if weather conditions are right.

The question of marketing the crop is about as important as growing it. The general practice in my section, also I believe in the two great potato producing counties of Accomac and Northampton below us in Virginia, has been to let the crop mature before beginning to market it. I have been thinking perhaps it would be better for all concerned if we on the Eastern Shore at least would imitate the practice of our brothers farther South, commence digging earlier, use a sorter or grader, thus making a uniform pack. We would not get so many barrels, I admit, but the price would be higher. There would not be so many cars put on the market in a short period. They would carry all right, of course, as they do so from farther South. My experience is that the Irish Cobbler potato will keep better if dug before full maturity, that is, a little green. It seems to me the right thing to do. The consumer would have a larger supply earlier in the season, the grade would be better, there would be less congestion of traffic on the railroads, and it would give the more northern grower a better chance. I have made up my mind to try it at any rate.

I think most of you are aware that the marketing of this crop on the Eastern Shore is done mostly through the Eastern Shore Produce Exchange of Virginia, located at Onley, and the Peninsula Produce Exchange of Maryland, located at Pocomoke City. These two organizations have been and are managed and conducted by men of ability, and have not only been successful in making money for their stockholders, a majority of whom are farmers, but have safeguarded the grower's interest, both in selling and buying his products, in fact, have been great factors in making both the Eastern Shore of Maryland and Virginia one of the garden spots of the world.

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It would be a revelation to lots of people and a source of pleasure as well, if they would take a trip occasionally down through the Peninsula, or as Mr. J. S. McMaster, of Pocomoke, so aptly calls it, "The Land of Evergreens." The well-tilled farms, the commodious and convenient farm dwellings, beautiful lawns, and no less beautiful women, prosperous and contented men, they would see all these in what the United States Government says is the most prosperous farming section in *the world*, and this condition has been brought about almost entirely by the growing of the potato.

As you notice, I have confined my talk to growing of the early potato, which I believe to be more profitable generally than growing the late or fall maturing crop. The profits from the late crop this last season I know have been large but the causes which brought on these market conditions are world-wide and cannot last, and I hope we will never see their like again. Therefore, under normal conditions I believe the spring or early crop to be the safest, and most profitable. There are several reasons for this; one is that prices are generally better, also we are able to get another crop off the land, and besides get in a cover crop of Crimson Clover, Vetch or Rye, thus keeping up soil fertility, a most important factor, which we cannot always do after the late crop. So with apologies to Messrs. Gilbert & Sullivan, I will say that

This is the reason I say or I sing,
Go plant the potato that grows in the Spring.

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COMMERCIAL POTATO CULTURE.

PROFESSOR T. C. JOHNSON.

Director Virginia Truck Experiment Station.

The importance of the Irish potato as a commercial crop is generally not fully recognized by the people outside of the immediate section where it is so grown. Within the last few years several new sections have been developed as producing centres, chief among these are the Coastal Plain regions of the upper south and central States. It is estimated that the truck crop potatoes brought into Virginia alone during the season of 1916, over $10,000,000. This is no mean sum when compared to the value of fruit, cotton or tobacco crops of the State.

Potato Soils.

The soils suited for this crop range from the light sandy soils of the upper south through the sandy loams, loam, clay loam, sandy clay, clays and gravel soils of the Freehold region of New Jersey. Underlying these top soils is usually a layer of yellow clay and sand, which in turn grades into common sand at a depth of three or more feet. These soils for best results should be well drained and abundantly supplied with organic matter. Some of them are naturally quite deficient in organic matter and need artificial drainage, but if these two difficulties are not rectified it is practically impossible to develop a profitable potato growing region on them.

Transportation.

Coordinate with good soils is good transportation. A location may have the very best of soils, but if it does not have adequate transportation facilities it will be seriously handicapped. This point is emphasized in bulletin No. 294 of the New Jersey Experiment Station recently issued. One cannot help but be impressed with the importance of close proximity to a railroad shipping point in the potato-growing regions of Maine, New York, Wisconsin, Michigan, and other northern and western States, where the wagon haul is more than four or six miles, the handicap is so great that other conditions must be very favorable, indeed, if the operators so situated can successfully compete with their more fortunately located rivals. The mere presence of a railroad or steamboat line through a prospective potato-growing section does not necessarily mean that transportation will be adequate. The transportation companies must of necessity make special concessions in the way of shipping facilities before the region may be successfully developed for this class of agriculture.

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Climate.

Climatic requirements do not seem to be so exacting as are those of transportation. Very productive potato areas have been developed on the sandy soils of Florida, the glacial soils of New York, the Coastal Plain region of the Carolinas and Virginia, the prairie soils of Minnesota and the Dakotas, the mountain soils of Colorado and Idaho, and the reclaimed swamp soils of California, thus giving all the varied climates from those of Florida to the Canadian border and from the Atlantic to the Pacific. However, in all of these regions there are short seasons in which temperature and moisture conditions are favorable for the rapid development of the crop. The extreme heat of the summer season of Florida or the extreme cold of the winter season in Maine does not interfere with the growth of the potatoes in the cooler part of the year in the one case and the warmer in the other. The climatic condition of the upper south and the middle Atlantic States is admirably adapted to the growing of this crop during the early spring and late fall in the Virginias and Carolinas, and during the early summer in Delaware, Maryland and New Jersey.

Rotation.

Potatoes should always be grown in rotation with some other crop. In some sections it is customary to follow a rotation consisting of potatoes, small grains, clovers or grass, while in other sections the rotation consists of one or two crops of potatoes followed by corn and other forms of legumes. In the trucking regions near Norfolk, Virginia, a rotation consisting of potatoes planted in February, followed by cowpeas planted after the potatoes are harvested in June, which in turn are followed by cabbage which is planted in the field in November, is practiced. The cabbage may be followed by a legume or forage crop, which in turn may be followed by spinach preparatory to the potato crop again the following spring. Whatever the system of cropping is it is very important to supply the land with an abundance of organic matter. This may be obtained either from turning under a leguminous cover crop or stable manure. Experiments at the Virginia Truck Experiment Station would indicate that sometimes fertility may be profitably maintained by the use of commercial fertilizers supported with annual crops of legumes, such as cowpeas, soy beans, or crimson clover, but that it is not feasible to attempt to maintain soil fertility without the addition of organic matter in some form. The farmer who attempts to maintain his soil fertility by the use of the fertilizer bag alone will surely deplete the productive capacity of his land.

Manures and Fertilizers.

There are undoubtedly no better results than those obtained from the use of barnyard or stable manure. Of course, we realize that it is practically impossible to obtain sufficient quantities of this material at reasonable price to justify its exclusive use, hence we have to adopt the system of supporting it by the use of other forms of plant food. The organic matter may be supplied in the form of

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some legume or non-legume cover crop as previously indicated, but these should in all cases be supported with liberal quantities of commercial fertilizers.

It is still an open question as to the exact quantity and the composition of commercial fertilizers to be used. These depend very largely upon the system of crop rotation followed, and to previous condition of the soils. Carefully performed experiments show that all soils in good physical tilth, that is, a soil liberally supplied with organic matter, well drained and in good tilth, can use more commercial fertilizer profitably than can a soil deficient in humus. It is realized that this statement may be questioned by some, but carefully conducted experiments will, it is thought, amply justify these statements. It is undoubtedly true that soils rich in humus require a comparatively less amount of nitrogen in the fertilizers than do those lacking in this element, hence it is frequently profitable to use a fertilizer containing a larger amount of ammonia on most of our sandy soils than we would use on the loam soils. The work at the Virginia Truck Experiment Station would seem to indicate that under eastern Virginia conditions best results may be obtained by using a fertilizer analyzing from 5 per cent to 7 per cent ammonia, 8 per cent phosphoric acid and 5 per cent potash. The amount of fertilizer depends, first upon the previous condition of the soil, and second, upon the time the crop is expected to be matured. It frequently pays to fertilize early crops more heavily than those that are to be harvested later. Of course, some of the fertilizer will remain in the soil after the early crop is harvested. This would be used by subsequent crops and not be lost. If a slow growing variety is used, a smaller amount of fertilizer may, under favorable conditions, be used than when varieties of quick maturity are grown.

The best methods of applying commercial fertilizer and stable manure are still open questions. Stable manure can undoubtedly be profitably applied broadcast for a crop of grain or clover when it is to be turned under for potatoes with good results. If the ground is bare at the time it is to be plowed, best results are usually obtained by spreading the manure over the ground and thoroughly discing it in before the land is plowed, rather than to plow it under without discing. If the manure is well rotted our growers seem to prefer to apply it broadcast after the ground is plowed and disc it in before the potatoes are planted. This leaves it in position where it is readily reached by the young potato roots.

Most growers follow the practice of spreading the commercial fertilizer in the bottom of the rows before planting; others spread a part of it broadcast before planting, and the balance is placed in the rows, while still others place about one-half of it in the row before planting and the balance is spread broadcast about the time the first culture is given. All three methods are strongly advocated. Which ever method is followed it is best to thoroughly mix the fertilizer that is spread in the row with the soil before the seed are planted, as there is grave injury if the seed tubers come in contact with the fertilizer in the row.

Seed Potatoes and Varieties.

At the present time the Peach Blow variety seems to be in the lead for the early crop in Florida; the Irish Cobbler variety in the region between Savannah and Southern New Jersey; while the early Ohio is the leading variety in the

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Ohio and Mississippi valleys. Other varieties are grown in different sections of the country. Numerous tests have shown that the Early Ohio does not thrive well on the Atlantic Coast, nor does the Cobbler thrive so well in the Mississippi Valley. The Cobbler produces a smaller yield in the northern States than does such varieties as Green Mountain and Giant, while in the South the contrary is true.

In the regions south of the Chesapeake Bay northern-grown seed are used almost exclusively for the early crop, but in the northern part of Virginia, the Peninsula and in Maryland, Delaware and part of New Jersey the home-grown seed are now extensively used. In Virginia the home-grown seed is produced by planting northern grown-seed in July and harvested in October and November. The home-grown seed usually produces larger crops than does the northern grown seed, but the crop is two weeks or three weeks later in maturing. Since the earliness of maturity is an important factor in marketing the crop, the growers in the southern extremity of the potato belt have adopted the practice of using northern seed in order to supply the market before the growers farther north are ready to ship. This deferentiation of grades of seed enable the growers to distribute their crop over a longer season, to prevent gluttoned markets and consequently insures better prices.

The exact amount of seed to plant is still an open question. Experiments seem to show, however, that large pieces give much better results than do small ones. It is realized that this statement is contrary to the practice followed by some growers, yet it is believed that carefully conducted tests amply justify it. It is feared that the high price of seed during the current year will cause the planting of very small pieces. This, together with the lack of potash in the fertilizer, is believed to be a serious menace to profitable potato production this season.

Cultivation.

It has been suggested by some successful growers that potato cultivation should be started a year or two previous to planting the crop. By this it is meant that it amply pays to put the ground into thoroughly good condition before the crop is planted. This statement will not be questioned.

As soon as growth starts the cultivation should start, or rather be resumed, also. That is before the potatoes appear above the ground the surface should be stirred in order to conserve moisture and to render plant food available. The early cultivation should be comparatively deep, but as growth advances the cultivation should be made shallow in order not to unduly disturb the root growth. Cultivation should be continued throughout the growing season. The better the crop is cultivated the better the growth under ordinary conditions will be. The soil should be kept practically level during the early cultivation, but as the season advances earth may be worked to the vines by means of winged cultivators in order to keep the tubers thoroughly covered and free from sun scald. The habit of root growth and tuber formation of the Irish Cobbler variety admits of deeper and closer cultivation than is advisable with most late varieties, but great care should be observed not to unduly injure the root system in any variety. Many growers do not stop cultivation until two or three weeks before digging is started.

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Spraying.

It is practically useless to attempt to grow good crops of potatoes without thoroughly spraying the vines. The spraying should be done for two purposes. First to control insects, and second, to control fungus diseases. Fortunately for the growers these two purposes may be accomplished with combination sprays. For the control of insects some form of arsenical poison is absolutely necessary. Our experiments would show that arsenicals in the form of Paris green, arsenate of lead, arsenate of lime, or arsenite of zinc all give good results. The preference for the materials depends largely upon the cost of the arsenic contained, and the convenience of application. Due consideration, however, should be given to the effect of the spray material upon the foliage. Arsenic in some form is much more injurious to foliage than in others. Among the newer materials arsenate of lime and arsenite of zinc are very promising. Of course, there are a number of proprietary insecticide mixtures which give splendid results. Here again, one should consider the cost of the material and the effect obtained in determining which to use. The old standard fungicide, Bordeaux mixture, is still in use. There have been numerous substitutes offered on the market, but these have not yet been able to supplant Bordeaux, consequently one is forced to the conclusion that there is still some virtue in Bordeaux that is not contained in most of the other mixtures.

The success in spraying depends very largely upon the thoroughness with which it is done. It is doubtful if there is any other operation in connection with potato growing that is as haphazardly done as is spraying, yet if it is properly done there is no other operation that will pay so handsomely.

Harvesting and Marketing.

The last and possibly the most important of all is the proper harvesting and marketing. Little need be said here about methods of harvesting. Different localities follow different practices. If the potatoes are matured when harvested there is undoubtedly advantage in using one of the numerous potato diggers, but if the potatoes are to be dug before maturing it is still a question about the advisability of using the mechanical diggers, consequently the growers in the upper south are still adhering to the old plow for this work. This we know is slow, but it gives excellent results.

Above all, probably the most important problem in the entire potato growing proposition is the marketing. The Bureau of Markets at Washington, the various State market bureaus and the various Produce Exchanges are accomplishing admirable results in this way. The main point is to bring consumer and the producer together. That is, to paraphrase, a popular political slogan, the object is "to bring the potatoless man and the manless potato together." There are many ways by which it can be done, the best of which is still an open question.

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SWEET POTATO CULTURE.

E. F. LECATES,

Delmar, Delaware.

The growing and marketing of Sweet Potatoes in some sections on the Delaware, Maryland and Virginia Peninsula is an industry of first importance. The climatic conditions and the soil in some sections are ideal for this crop. It amounts to hundreds of thousands of bushels, and brings in hundreds of thousand of dollars annually. It is hard to estimate its entire specific economic value, but its total is very large. It adds quite materially to the prosperity of the producers, and supplies an economical food product to millions of consumers. Lands that were considered almost worthless a few years ago, because they were so poor and sandy, are now highly prized for sweet potato growing. Sweet potatoes are gradually becoming more generally used for food purposes, and give promise of becoming still more popular in the future.

Under proper methods of fertilization and cultivation large crops can be produced. As a matter of fact most farmers in the sweet potato sections of this Peninsula need very little instructions as to the methods of production so far as yield is concerned, because most of them already know how to produce maximum crops. There are, however, real problems connected with the industry. The real problems are those of preservation and marketing. The problem of preservation chiefly affects those who grow sweets for storage purposes, to be marketed during the winter as "Kiln Dried Sweets." The problem of marketing affects all who grow them for market.

The 1916 crop grown chiefly in sections for storage purposes, was a short one; probably not more than 50 to 60 per cent of a crop. The cause for this was partly due to the climatic conditions, partly due to disease which affected the plants in the field after being set out, and partly due to the insufficient amount of potash in the commercial fertilizers used.

One fact was noticeable, however, on real high sandy soil the yield was lighter than on heavier and lower soils. This might have been due to the fact that the lower or heavier soils contained more available potash. The general appearance and shape of the crop of sweets for 1916 was good, and went into storage in apparently fine condition, showing less effect of disease in the potatoes than in some years. The keep since going into storage has varied. In some instances it is good, in others they are showing some decay. The average keep has been fair, but not quite so good as the keep of the 1915 crop. The reason for this at this time does not seem to be explainable.

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Varieties—The varieties most commonly grown on the Peninsula are: "Big Stems," "Gold Skins," "Up Rivers," "Big Leaf," "Carolinas," of the yellow variety; "Hayman" and "Southern Queen," of the white, and "Red Nansmond," of the red. There are other varieties, but these are the most popular. For late summer and fall marketing on the Eastern Shore of Virginia and parts of Maryland, they grow the "Big Stems," principally because they can get large yields of these early. They also grow some "Gold Skins." These are also used for storage sweets, but are usually taken out of storage during the late fall or early winter, as they are not regarded as good long keepers as some of the other varieties. For the main crop of storage or winter sweets the "Up Rivers," "Big Leaf" and "Carolinas" are used, principally because they are better keepers, and carry better in transit after being taken out of storage. The other varieties, "Hayman," "Southern Queen" and "Red Nansmond," are principally grown for home use, and are not used extensively for market. They usually keep well until late winter or spring, and have good eating quality. The "Gold Skin" is a very beautiful potato, and its quality is good until around January 1st, after which it begins to get pethy, and lost quality. The quality of the "Up Rivers," "Big Leaf," and "Carolinas," is probably not quite so good as the "Gold Skin," but it remains practically uniform throughout the winter, and usually comes out of storage with less decay than the others, with fair to good quality. All of these varieties under proper conditions and methods of tillage yield well.

Good, strong, healthy plants are of prime importance in growing sweets, and in order to insure these nothing but clean, healthy seed, free from disease, should be used in starting the plants. Most growers think that plants grown from what is most commonly called "slips" are superior to plants grown from cull or small potatoes. Slips are potatoes that are grown from portions of the vines cut and set the previous year. These slips should be grown from nothing but healthy vines. The plants may be started by the ordinary hot beds, or by beds whose heat is gotten artificially from fire flues beneath them. These beds are usually covered with glass, oiled muslin or by pine straw (shats). In making these beds it is important to use good, clean sand, free from disease. Do not use the same sand year after year in making these, as there is danger of disease from the decayed sweets. Don't bed too closely, as this has a tendency to make the plants slender, and weak. Cover the seed with 1½ to 2 inches of sand. The first drawing from the bed are stronger plants, and are more likely to produce a good crop than any other drawing from the same bed. Therefore, it is very important to bed sufficiently for your entire setting from the first drawing.

Some growers give their seed for bedding the corrosive sublimate treatment before bedding. Which is: Soak for 5 to 10 minutes in a solution of 1 ounce of corrosive Sublimate to 8 gallons of water; and allow to dry thoroughly before bedding. They also give their beds and frames the formaldehyde treatment, which is: Drench their beds and frames with a solution of 1 pint Formalin to 30 gallons of water. These treatments are worthy of a trial, although not generally used and their specific value is not as yet fully demonstrated.

Sweet potatoes will grow and produce good crops on almost all kinds of soils, especially the soils of this Peninsula; but to do their best they require a sandy

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soil, moderately supplied with organic matter. It is not necessary to plant in sandy soil from the standpoint of yield, because they will yield well on heavy soils, but from the standpoint of quality and appearance. They will almost invariably keep better in storage when grown on sandy soils than when grown on heavy or low soils.

It is best to begin the preparation of the soil for sweets one year ahead. If possible, have the land in some intensively cultivated crop the year previous, in order to kill out as much weed growth as possible. If barnyard manures are used it is best to use them the previous year, as they are of doubtful value in growing sweets when applied the same year the sweets are to be grown. They have a tendency to spoil the appearance of the sweets. If the land is insufficiently supplied with organic matter it is advisable to sow rye or some other crop to be plowed under in the spring. This prevents the soil from being blown away during the winter, and also loosens it up if it is a little too heavy. Plow shallow, 2 or 3 inches deep as early in the spring as possible. The shallow plowing has a tendency to make the sweets short and chunky as the present day market demands. Harrow several times before planting, in order to put the soil in fine condition. This will keep out weeds and grass, and help to hold the moisture which will help you to get a good stand of plants when setting if the weather should happen to be dry.

The previous condition and treatment of the soil should have much to do with determining the proper fertilization for the growing of sweets. If the soil is already in a fertile condition, less fertilizer will be required than if the soil is in poor condition. If following a legume crop, a fertilizer carrying less ammonia may be used than if following other crops. Commercial sweet potato growing is now done almost exclusively with commercial fertilizers, and experience seems to indicate that they require a rather large amount of potash. I have no specific data as to just what effect potash has upon sweet potatoes as to yield, but the 1916 crop indicates that it has an effect. The 1916 crop was grown with the use of very little potash, and it was the shortest for several years. A portion of this shortage was probably due to other causes, but it seems reasonable to conclude that a part of it was due to the shortage in potash in the fertilizers used. When it can be had, a fertilizer carrying 3½ per cent Ammonia, 8 per cent Phosphoric Acid and 7 to 10 per cent Potash has proven a satisfactory formula. Such a fertilizer can be had from mixing 700 pounds dried fish, or concentrated tankage, 1000 pounds 16 per cent acid phosphate and 300 pounds either muriate or sulphate of potash. I have personally found the above formula a very satisfactory one. Of course, it has been necessary to compound fertilizers for past two years, with very little or no potash, as the available commercial supply is cut off by the war in Europe. The previous condition and treatment of the soil, also the method of using same, will have much to do with the determining of the amount to be used. Some growers are using the fertilizer broadcast, others in the drill; and some of them use it both ways. When used both in the drill and broadcast the application of 1000 pounds broadcast and 500 pounds in the drill per acre of such a fertilizer as has been described above, should prove a proper application on most soils. If all is used broadcast a heavier application may be used. If all is used in the drill a lighter application would be preferred, because there is danger of killing your

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plants when they are set if too heavy an application is used in the drill. Some growers also use a part of the fertilizer on the beds after the plants have been set. This has been found to be very satisfactory.

If your plants are already started, your soil prepared and fertilized as stated above, you are ready to start planting. This you should be ready to do not later than the middle of May, as early set plants will produce better than the late ones. Use care in setting the plants, as a good stand is very important in obtaining a maximum yield. Replantings usually do not produce well.

The horse-drawn transplanter is used where a large acreage is to be set, and is found to be very satisfactory. The plants live well when set by this method, and are in straight rows almost level with the surface of the soil, which permits early harrowing to be close up to the plants, doing away with the necessity for a great deal of hand work with the hoes. Other growers still use the ordinary hand transplanter, and find them very satisfactory. The plants are set in rows 30 inches wide and from 15 to 20 inches apart in the row. When set this way it will require about 12,000 plants to the acre.

The cultivation should be started soon after the plants are set. Use the ordinary riding or walking cultivators that are used for the other truck crops. If the cultivation was thorough enough before the setting of the plants, and prompt and thorough enough afterwards, you will have very little trouble with the grass and weeds starting. Very little hand hoeing is required now, as wheel hoes have taken the place of the hand hoes, and fine tooth weeders which are now used help to do away with the necessity of this work. In using the wheel hoes it is necessary to use them very often in order to be successful. Five or six harrowings and three or four weedings will generally be sufficient. After the vines get started, vine turners are fastened on the cultivators to lift the vines out of the way of the cultivator teeth. If the cultivation has been often and thorough, no more weedings will be necessary and very little harrowing.

The subject of the "Diseases of Sweets" is probably not a proper one for discussion by the ordinary laity of the industry, but is more properly a subject for discussion by our plant pathologist and scientific men of our colleges. Most sweet potato growers know very little about the causes of the diseases that attack their crops, and less about prevention. The one thing they know something about is the large losses they sometimes cause. Even our scientific men have not been as successful in combating some of the diseases of the sweet potato industry as they have been in solving other problems in the agricultural line. I think, however, they are making some progress. The most common diseases affecting sweet potatoes as they are commonly known, are black rot, black shank, wilt and brown or mush rot. Of these probably the black rot is the most disastrous. In fact, there are years when it causes more loss than all the others combined. In black rot the whole potato does not rot at first, it appears in patches on the potato just a little more than skin deep, but it destroys the usefulness of the whole potato for food as the taste spreads to the entire potato.

In storage black rot soon spreads to the whole potato, and to others; soon destroying the whole bin.

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Wilt effects the plants in the field after they have been set. It is sometimes very disastrous, causing large, broken patches in the field, resulting in loss.

Mush or brown rot usually affects the potatoes after they are put into storage. It is of a brownish color; the potato rotting through and through.

Digging can be done any time after the potatoes are large enough to use or market, and the market conditions justify. A few week's growth, however, will sometimes add to the total yield quite materially. It is best to dig during bright sunshiny weather if possible, as the earth will more readily fall from them giving them a much better appearance. This is especially important with sweets intended for storage purposes; as they should go into storage in as dry a condition as possible. This, in addition to their appearance, will help their keeping qualities. In digging use care to avoid cutting, skinning or bruising the potatoes, as this will likely start decay. Some growers still use the ordinary plow for turning them out, but a great many are using the specially built potato digger or plow, which has steel fingers like mouldboards that lift the potatoes to the surface of the soil where they may be readily picked out. This implement has the special advantage of leaving the land level after the potatoes are removed.

The Eastern Shore of Virginia and parts of Maryland usually market their sweets when dug late in summer and early fall, therefore the problem of storage and keeping does not apply to them to any great extent. A great many of the sweet growers on the Peninsula grow them for storage, to be marketed during the winter, as what is known as the Kiln Dried Sweets. The storage and keeping problem is, therefore, one of the largest problems connected with the sweet potato industry. In fact, I am not sure that it is not the largest and most difficult problem to solve that is connected with the industry. Almost any kind, size or shape of potatoes can be used if they are free from decay, but decayed potatoes are worthless. Of course, methods of storage cannot completely control the keeping qualities, but they can help materially. The storage house itself should be constructed so as to combine proper temperature and ventilation. It is best to construct the bins with double walls so as to give a chance for ventilation between the walls. If the bins are large, ventilators should be placed in the middle of the bins. Ample ventilator openings should be provided in the roof of the building. The building should be provided with sufficient windows for light and for opening up in moderate weather for ventilation.

The potatoes should go into the storage house dry and free from cuts and bruises. Potatoes from fields showing decay should not be stored but should be marketed at once. Especially does this apply to potatoes showing decay from black rot. When potatoes affected by black rot are subjected to high temperature of artificial heat, they usually decay rapidly.

The temperature at which potatoes should go into storage and later be kept is still a debatable question, but it seems to be the opinion of most storers that they should start at a fairly high temperature, 80 to 90 degrees, with plenty of ventilation, and so kept until thoroughly dried. The temperature then may be lowered to around 50 to 60 degrees, and so kept during the remainder of the storage period.

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When storing avoid any rough handling, such as throwing from a basket to the top of a bin, and when they are once placed in the bin do not move or disturb. By so doing you are inviting decay, and when decay starts it is almost impossible to control it. There are years when sweets will decay in spite of every known precaution. Crops from individual fields will sometimes decay with no explainable reason; at other times they will keep without any extraordinary precaution to prevent decay. The most successful growers, however, use every known precaution from the growing of the potatoes to the marketing of same.

As previously stated the Eastern Shore of Virginia and parts of Maryland market most of their potatoes when dug in the late summer and fall. They are usually marketed in the standard coopered barrels with burlap covers. The kiln dried sweets are marketed during the late fall and winter in the bushel hampers. Whatever the package used it is of the utmost importance to grade and pack honestly. Potatoes that are too large or too small, or illshaped, or badly discolored, cut or bruised should not be packed as No. 1's, but should be graded and packed as No. 2's or culls. No attempt should be made to market those showing decay under any grade or brand. Fill the packages full and tight, and then finish to give a good appearance on opening. Potatoes rightly graded and packed are half marketed.

The present day market demands a reasonably short chunky potato, not too large nor too small; although the tendency during the last few years has been to grow a smaller rather than a larger potato. The size and shape can be regulated to some extent by the methods of cultivation and planting.

When sweets are packed they should be marketed at once, as they will not remain in packages in good condition very long. Especially does this apply to the kiln dried sweets.

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THE DAHLIA.

RICHARD VINCENT, JR.

My interest in the Dahlia has been lifelong. When as a boy my father, who was a gardener by profession, planted about one dozen roots obtained from somewhere, child though I was my interest in this grand flower was excited and I offered my entire fortune, which was sixpence, to my father to allow me to call one my own. The transaction was accompished and this made me at that time one of the proudest boys in the land. I had something to show my playmates that none of them had.

Inception of Our Society.

I have for several years thought that there ought to be a Dahlia society organized on broad lines to disseminate knowledge of this grand flower, look after the new varieties and eradicate indifferent ones, to classify them and so forth, also publish something that would keep unscrupulous dealers from forcing worthless trash upon the public.

In the spring of 1915 the cry went out from a number of our prominent growers and also the trade papers regarding an organization. By request I issued a call and we met in New York, May 10, 1915. We organized and formed the American Dahlia Society. Much to my surprise I was elected President. I cannot but thank those that gave me this high honor, as I feel that there is in this organization the nucleus for one of the largest floricultural societies in North America.

Soon after organizing, the New York Horticultural Society offered us facilities for making a show in New York City, in one of New York's finest buildings, and placed at our disposal one hundred dollars for premiums. We gave a show there in Sept. 24-26, that we think did credit to our young organization, especially when the weather conditions, heat and storms are considered, which destroyed the flowers of several of our largest exhibitors.

The future of the Dahlia as a cultivated plant on this continent is assured and the prospects for our society are very bright. The Dahlia is everybody's flower, easy of cultivation, beautiful in its manifold forms and colorings, unequaled by very few other garden flowers. Almost any one can have and enjoy these favorites, and that they are favorites is shown by the enormous quantities that are grown every year. There are thousands of little gardens where this flower can be grown and grown with the greatest success.

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Soil and Fertilizers.

The most suitable soil for growing Dahlias is a sandy loam. Heavy soils can be lightened by the use of coal ashes or sand, anything that will help to make the soil porus. Whenever possible the land for Dahlias ought to be plowed or spaded up in the fall. The action of freezing helps to make the soil more pliable.

We, ourselves, use very little manure, preferring bone meal with the addition of a little potash, rather than manure. If the ground is spaded in the fall or early winter the bone could well be mixed with the soil at that time. In using manure we would rather use it as a mulch put on any time after the plants or roots are set. Any kind of material used for mulching around the plants will retain moisture and save watering, and if the soil is watered it will keep from baking. By using bone we get a more stocky growth and more flowers — at least this is our experience.

Summer Treatment.

We find that the June planted Dahlias invariably give us the finest exhibition blooms. The early plantings have the extreme hot weather to contend with. This very often causes an indifferent growth as the stalk gets hard and the plant forms a mass of small, weak limbs with poor flowers, if any, and subject to diseases and insect pests. This condition can only be remedied by a vigorous use of the knife, cutting back hard so as to cause the plant to make a new and strong growth.

The Dahlia is not exempt from insect pests any more than other flowers. Growers will find that a few sprayings, especially during a drought, are advantageous. Tobacco solution, soap, etc. — almost any insecticide — will answer except for the black Aster bug, which feeds on the flowers alone. If these are not too numerous, hand picking is the best remedy. They can easily be seen as they very seldom touch the dark colored flowers.

To have the Dahlia to grow and show to the best advantage the plants ought to be tied up to a strong stake, and to get large flowers, thin out when too many limbs start out from the stool or main stalk, also disbud those that remain and which are to carry the flowers.

Selections.

SIX BEST PEONY-FLOWERED DAHLIAS

Bertha von Suttner
Geisha
Germania
Glorie de Baarn
Queen Wilhelmina
Queen Emma

SIX BEST SHOW DAHLIAS

A. D. Livoni
Chas. Lanier
Ethel Maule
Souv. Mme. Moreau
Yellow Duke
Zebra

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NINE BEST CACTUS

Countess of Lonsdale
Golden Gate
J. H. Jackson
Kalif
Marguerite Bouchon
Rene Cayeaux
Sweetbriar
Wodan
Wolfgang von Goethe

SIX BEST POMPON

Alewine
Allie Mourey
Indian Chief
Little Beauty
Little May
Snowclad

SIX BEST DECORATIVE

Delice
Hortulanus Viet
Jack Rose
Jean Charmant
Le Grand Manitou
Papa Charmant

SIX SINGLE CENTURY

Ami Barillett
Fringed 20th Century
Rose Pink Century
Sensation
Setting Sun
White Century

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REPORT OF THE MEETING OF THE WESTERN NEW YORK HORTICULTURAL SOCIETY.

By C. A. McCUE.

It was my pleasure to represent the Peninsula Horticultural Society at the 62nd Annual Meeting of the Western New York Horticultural Society held in Convention Hall, Rochester, N. Y., on Jan. 24, 25 and 26, 1917.

The sessions of the meeting were well attended, nearly a thousand fruit growers being present at some of the afternoon sessions. The interest shown was intense at all times, and I doubt if anywhere else in the country a more live, earnest and business-like group of fruit growers could be brought together than was found in Rochester at this meeting. The meeting was an inspiration to all lovers and growers of fruit who attended the sessions. The talks were short and to the point, but the discussion was unlimited. The particular feature of the whole meeting that appealed most to me was the free and unlimited discussion that followed the presentation of each paper. In fact most of the valuable information of the meeting was drawn out by the lively discussions.

Another very interesting and valuable feature of the sessions was the question box. Not only were long lists of questions printed in the official program, but a box for the reception of questions at all times occupied a conspicuous place in the hall. Whenever a lull in the program occurred the question box was taken up and many lively, good-natured tilts followed the discussion of the questions asked.

The exhibit of fruit was not large, as it was largely educational in its object. The exhibit of apples by the New York Agricultural Experiment Station from Geneva, was the feature of the exhibition room. The orchard machinery exhibit was large and very instructive. Practically everything connected with orchard operations was on exhibition, from sprayers to graders, harrows, plows, etc. As New York is a great nursery state, of course, it was to be expected that the nurserymen would be out in force in the exhibition hall, and they were. Cornell University had a fine exhibit showing the work of the Departments of Entomology and Plant Pathology.

To return to the program. The first session was opened by an apple paper by Dr. Van Slyke, of Geneva, on the present outlook for commercial fertilizers. The various sources of plant food were briefly reviewed; considerable time was taken up with a discussion of the probable commercial sources of potash.

A short paper on Control of Pear Psylla followed. The writer of the paper was a large pear grower, and he claimed to have successfully controlled the Psylla by careful spring spraying with lime sulphur just before the buds opened.

Prof. V. B. Stewart, of Cornell, discussed dust spraying for nursery stock claiming that the dust was more effective and much more easily and cheaply applied. As we have but few nurseries in Delaware the paper would have but little interest to our growers.

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Two of the most valuable and commercially important papers of the meeting were those presented by Professors Stewart and Parrott, of the Geneva Experiment Station, on the relation of insects and diseases to the apple grading law. Where the apple grading law had been enforced considerable trouble had resulted from the presence of disease spots, particularly scab, and from various insect injuries found on the apples when inspected. The growers claimed that the apples were free from disease and insect injury when packed. The inspectors, however, contended that the injuries must have been present when the fruit was packed and held that the trouble could not have developed after packing. The question Professor Stewart attempted to answer was: "Can it be told by inspection of the fruit whether or not the disease was present at time of packing or developed later, while the fruit was in storage?" Professor Stewart's answer was: "Apple scab may develop in storage if the storage temperature is too high. This development may easily occur in common storage; but I can find no evidence to support the assertion that it will develop in chemical cold storage where the temperature is brought down and maintained at the proper point." In most cases the expert can quite easily tell if the scab infection occurred before or after the apple was picked. If cork spots are found under the scab and if the edges of the scab spot are rough and ragged it is pretty conclusive evidence that the scab was there when the apple went into the barrel. Cork spots cannot form after the fruit stops growing. Professor Stewart said that in his judgment a great deal of scab developed between the time the apple was packed and the time it went into storage. Conviction for fraudulent packing of scabby apples can only be secured when it can be definitely proven that the scab was on the apple when it went into the barrel. Professor Stewart was positive that such apples could be told. As regards sooty blotch, the evidence was not clear, but is not likely that sooty blotch will develop under proper storage conditions. With the soft rots, as they usually develop in storage, an inspector will have to take the word of the grower that no soft rot was present when the fruit was packed.

As regards insect injury occurring after packing, Professor Parrott said that there was but little chance of this occurring if the fruit has been held at the proper temperature. If Codling moth cocoon or pupuae cases are found in the barrel it is pretty conclusive evidence that the fruit was wormy when packed.

This information is particularly timely to Delaware growers on account of the fact that the apple grading law will go into effect next fall, and doubtless some of these questions will come up.

The paper on Dust Spraying, by Dr. Reddick, was of considerable interest. Much interest has been aroused by dust spraying, and I was anxious to get the true facts in the case. After listening to this paper, and subsequent discussion, and after talking with many growers who had used the dust method, I was forced to come to the following conclusions:

1. Dust spraying is still in the experimental stage.
2. Dust spraying is a valuable auxiliary for the man with many acres of orchard to spray in a short time. The duster should be held as a reserve machine to use in case of emergency.
3. Dust spraying is far from perfect, but advancing rapidly.

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4. That I could not recommend to any Delaware apple grower that he abandon liquid spraying for dust spraying.

5. That I could not recommend any Delaware apple grower to buy a Dust outfit for his sole means of combating insects and diseases on fruit.

The one other paper that ought to prove interesting to our people was one by Mr. Toan, the County Agent of Monroe County, N. Y. Mr. Toan presented conclusive evidence that it was easy and feasible to control leaf curl of the peach by fall spraying. Mr. Toan advocated spraying with scale strength lime sulphur just as soon as the leaves had fallen from the peach trees in the fall.

Dr. S. W. Fletcher, of State College, Pa., thought that the outlook for profitable apple growing was very promising.

Taking everything into consideration, I will say that the Rochester meeting of the Western New York Horticultural Society was one of the most interesting, wide awake and instructive horticultural meetings that I have ever attended, and I earnestly advise any who ever have an opportunity to attend the meetings at Rochester, to do so.

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REPORT OF THE NEW JERSEY HORTICULTURAL SOCIETY.

By H. C. RICHARDSON.

I had a very pleasant visit in December to the Forty-second Annual Session of the New Jersey Horticultural Society in Burlington. Mr. C. Fleming Stanger, the President of the Society made the meeting very enjoyable, and also made your delegate feel quite at home. I was not so much interested in the discussions on truck growing and market gardening as I was in those about fruits, for personally I am a fruit grower, but those phases of the subject were extremely interesting and enlightening.

One of the most interesting papers was by Prof. Blake, who gave an account of the early work of Mr. William Coxe, who, in 1817, wrote a book entitled "The Cultivation of Fruit Trees." Mr. Coxe has been quoted since that time. In his book he gives an account of the origin of a number of varieties of apples and a long list of those he would recommend, and the purpose for which they were grown. Prof. Blake suggested that some steps should be taken to mark the site of the Maiden Blush, Belle Flower and the Roman Stem, all of which originated near Burlington.

Mr. Walter L. Minch gave an account of experiments on the Minch Brothers farms to determine the value of potash in growing potatoes. When potash was plentiful and cheap it was their practice to use this element of fertilizer liberally, ordinarily a formulae containing four per cent. of ammonia, eight per cent. phosphoric acid and ten per cent. of potash, but last year excellent yields of potatoes were secured with very little potash and even with no potash. Probably explained by the fact that in some cases potash had been applied heavily in previous years, and in others that line was used which released potash that was worked up in the soil. At any rate, the discussion was extremely interesting.

Mr. de Baun gave an account of the Chicago Vegetable Meeting, and Prof. Blake gave a very instructive talk on peach growing.

Professor Headlee gave a lantern slide talk, showing some of the insects that have been troublesome in New Jersey, particularly the rosy apple aphis. This aphis is controlled by the dormant spray with nicotine added, provided this spray can be used after the aphis hatch, but if they do not hatch out to be killed by the dormant spray, they should be sprayed later when nicotine, diluted lime sulphur, and soap make an effective spray.

The whole meeting was extremely interesting and I suggest that members of this Society send to the Secretary, Mr. Howard G. Taylor, Riverton, for the report of the meeting, as it will be well worth reading.

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